WELCOME

Congratulations on becoming the new owner of a Sea Ray®, the world's most prestigious manufacturer of boats. We welcome you into our worldwide and ever-expanding family of boating enthusiasts.

This Owner's Information Package, should be kept on board your Sea Ray®, and will provide important information about features of your boat.

For years of trouble-free boating, take the time to carefully review the information in this package and really get to know your boat. **Have everyone who will operate your boat read the Owner's Manual.**

The Owner's Information Package contains the following:

- **Owner's Manual**

The Owner's Manual contains a General Information pertaining to all or most Sea Ray Sport Yachts, and Model Specific Information sections with information specific to individual Sea Ray Sport Yacht Models. The Owner's Manual gives you important operating and safety information, as well as reminding you about your responsibilities as a boat owner/ operator.

- **Original Equipment Manufacturer (OEM) Information**

The OEM Information of your Owner's Information Package contains information provided by the individual systems manufacturers of equipment installed on your boat. Examples include the engine, engine control and electronics equipment. Throughout the Owner's Manual you will be referred to information provided by manufacturers of specific systems.

For a complete library of all Sea Ray manuals including owners, systems, accessories, and options please visit www.searay.com. There you will be able to view all Sea Ray manuals and any items that are not included in this manual.

Because your purchase represents a substantial investment, we know you will want to take the necessary measures to protect its value. We have outlined a program for proper operation, periodic maintenance and safety inspections. We urge you to follow these recommendations. If you have questions which are not fully covered by the Owner's Information Package, please consult your authorized Sea Ray® Boats dealer for assistance.

Thank You For Selecting A Sea Ray®!
Bon Voyage

Information in this publication is based upon the latest product specifications available at printing. Sea Ray® Boats, Inc. reserves the right to make changes at any time, without notice, in the colors, equipment, specifications, materials and prices of all models, or to discontinue models. Should changes in production models be made, Sea Ray® is not obligated to make similar changes or modifications to models sold prior to the date of such changes.

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Note: Not all accessories shown in pictures or described herein are standard equipment or even available as options.
Options and features are subject to change without notice.

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Some features or accessory manuals may not be contained in this publication. Please visit www.searay.com for a complete library of all Sea Ray Owner's and Accessory Manuals

1. This Manual

The material here and in the rest of the Owner's Information Package:

- Gives you basic safety information;
- Describes the fundamentals of boat use;

While the Supplement:

- Describes the features of your boat;
- Describes the equipment on your boat;
- Contains service and maintenance information.

You must learn to safely operate this boat as well as read, understand and use the information contained in this packet.

What this manual does not give you is a course in boating safety, or how to navigate, anchor, or dock your boat. Operating a power boat safely requires more skills, knowledge, and awareness than is necessary for a car or truck.

2. Your Responsibilities

For your safety, the safety of your passengers, other boaters and people in the water, you must:

- Take a boating safety course;
- Get instruction in the safe and proper handling of your boat;
- Understand and follow the "Rules of the Road";
- Learn how to navigate;
- Register:

  You must register this boat in the state where it will be used most frequently, many states require additional registration when an out-of-state boat is used within their boundaries.

  Contact state boating authorities or any marine dealer for registration requirements.

3. Sources of Information

In North America, contact one of the following for boating courses:

- U.S. Coast Guard Auxiliary
- U.S. Power Squadron
- Canadian Power and Sail Squadrons
- Red Cross
- State Boating Offices
- Yacht Club

Contact your dealer or the Boat/U.S. Foundation at:

1-800-336-2628

Outside of North America, contact your boat dealer and/or your governmental boating agency for assistance.

A book that provides a comprehensive background in boating is Chapman - Piloting, Seamanship and Small Boat Handling, by Elbert S. Maloney, published by Hearst Marine.

4. Dealer Responsibilities

In addition to a predelivery check and service of the boat, your dealer is to give you:

- A description and demonstration of the safety systems, features, instruments and controls on your boat;
- An orientation in the general operation of your boat;
- An "In Service Check List" form completed by you and the dealer after your inspection of the boat;
- A review of all warranty information and how to obtain warranty service;
- The Owner's Information Package.

If you do not receive all of these materials, or have any questions, contact your dealer.

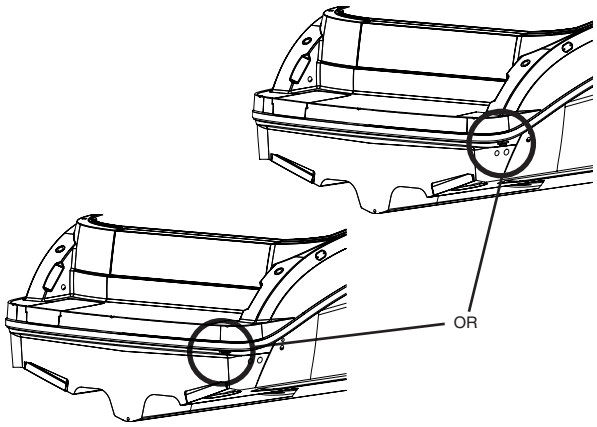
5. Warranties

Your boat comes with several warranties. Each component and/or system on your boat has its own warranty that will be found with the specific information and manual for that component. These are included with your Owner's Manual Packet. Locate and read the individual warranties; then put them together for easy future reference. The Sea Ray® warranty is on the warranty information sheet in your packet.

6. Hull Identification Number (HIN)

The "Hull Identification Number", (Fig. iv.1) will be located either on the starboard side of the transom, or on the aft, starboard side of the gunwale, and is your boat's most important identifying factor. This number must be included in all correspondence and orders. Failure to include it creates delays. Also of vital importance is the engine serial number and part number when writing about or ordering parts for your engine. Refer to the Engine Operator's Manual for location of engine serial number and record it for future reference.

Hull Identification Number Location (Fig. iv.1)



7. Manufacturer's Certification

As a boat manufacturer, Sea Ray® builds their products to guidelines established under the Federal Boat Safety Act of 1971. The Act is promulgated by the United States Coast Guard who has authority to enforce these laws on boat manufacturers that sell products in the United States. Sea Ray® ensures that all of its products comply with these laws.

The National Marine Manufacturers Association (NMMA) provides Sea Ray® with a third party certification. The NMMA is an organization that represents the marine industry and assists manufacturers, boat dealers, marinas, repair yards and component suppliers in areas of legislation, environmental concerns, marine business growth and state and federal government agency interaction. The third party certification that Sea Ray® participates in, uses the well known Standards and Recommended Practices of the American Boat and Yacht Council (ABYC).

Sea Ray® Boats participates extensively in the ABYC which is a nonprofit organization that develops and publishes voluntary standards and recommended practices for boat and equipment design, construction, service and repair. We utilize all applicable ABYC standards in the construction of your Sea Ray® boat.

Finally, Sea Ray® sells their products world wide and as such must conform to the various rules and regulations required by other countries. Most notably, are the ISO standards in Europe which require the application of the Common European (CE) mark. This mark, much like the NMMA certification here in the US, gives you the boat owner specific information concerning your craft. For more on this, turn to Section 1 • Safety, subsections 9 and 12 which explains in detail the CE plate and its importance.

8. Service, Parts and Repair for Your Boat

When your boat needs service, parts or repair, take it to an authorized Sea Ray® dealer. To find a dealer in your area please visit www.searay.com

To find repair and parts facilities for the equipment installed on your boat, refer to the manual for that component.

If a problem is not handled to your satisfaction:

1. Discuss any warranty-related problems directly with the service manager of the dealership or your sales person. Give the dealer an opportunity to help the service department resolve the matter for you.
2. If a problem arises that has not been resolved to your satisfaction by your dealer, contact Sea Ray® Boats via www.searay.com and the appropriate customer service department information will be provided to you.

9. Warranty Information

You will find information regarding the Sea Ray® warranty following the introduction. A warranty information card is also included in the Owner's Manual Packet. If for some reason this information missing, contact your Sea Ray® dealer.

About Your Limited Warranty

Sea Ray® offers an express Limited Warranty on each new Sea Ray® purchased through an authorized Sea Ray® dealer. A copy of the Limited Warranty was included in your owner's manual packet. If for any reason, you did not receive a copy of the Limited Warranty, please contact your local dealer for a replacement copy. This is a summary of several provisions of the Limited Warranty. Please read the Limited Warranty, which is the controlling document.

Under the Limited Warranty, Sea Ray® covers: (a) structural fiberglass deck or hull defects which occur within five (5) years of the date of delivery; (b) parts founds to be defective in factory material or workmanship within one (1) year of the date of delivery; (c) laminate blisters resulting from defects in factory material or workmanship for five (5) years on a prorated basis.

Sea Ray's obligation under the Limited Warranty is limited to repair or replacement of parts that are judged defective by Sea Ray® and does not include transportation, haul out, or other expenses. The foregoing is the **sole and exclusive** remedy provided by Sea Ray®.

The Limited Warranty does not cover engines, stern drives, controls, propellers, batteries, trailers, or other equipment or accessories carrying their own individual warranties, nor does the Limited Warranty cover engines, parts or accessories not installed by Sea Ray®. The Limited Warranty does not cover cosmetic gel coat finish. Boats used for commercial purpose are excluded from coverage. **See the Sea Ray® Limited Warranty for other exclusions.**

SEA RAY® EXPRESSLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS. NEITHER SEA RAY® NOR THE SELLING DEALER SHALL HAVE ANY RESPONSIBILITY FOR LOSS OF USE OF THE BOAT, LOSS OF TIME, INCONVENIENCE, COMMERCIAL LOSS OR CONSEQUENTIAL DAMAGES.

The unexpired term of the limited warranty may be transferred to a subsequent owner upon the new owner's request, except this limited warranty will not transfer to any subsequent owner of a boat which has been salvaged or resold after declaration of a total loss or a constructive total loss, i.e., the cost of repair exceeds the value of the boat. The new owner can submit this request, free of charge, via the searay.com website or through a local authorized Sea Ray Dealer where processing fees may be applied. Sea Ray reserves the right to reject any warranty transfer request for a boat that has been damaged, neglected, or otherwise previously excluded from warranty.

Thank you for your decision to buy a Sea Ray®.

The Sea Ray® Limited Warranty is subject to change at any time at Sea Ray's discretion. The information contained herein is general information about the Limited Warranty for the owner's general knowledge, but does not alter or amend the terms of the Limited Warranty.

SAFE BOATING MEANS:

- Knowing the limitations of your boat;
- Following the Rules of the Road;
- Keeping a sharp lookout for people and objects in the water;
- Not boating in water or weather conditions that are beyond the boat's or the operator's capability;
- Never boating when the operator is under the influence of drugs or alcohol;
- Being aware of your passengers' safety at all times; and
- Reducing speed when there is limited visibility, rough water, nearby people in the water, boats, or structures.

Boating in beautiful weather and calm water conditions can be a wonderful experience. Pleasurable boating, however, requires considerably greater skills than operating a land vehicle. To obtain these skills, you must:

- Take a Coast Guard, U.S. Power Squadron or equivalent boating safety course. **Call the Boat/U.S. Foundation at 1-800-336-2628 for information on available courses.**
- Get hands-on training on how to operate your boat properly.

IN ADDITION:

- Maintain your boat and its safety and other systems as recommended in this manual.
- Have the boat inspected by a qualified mechanic or dealer, at least annually.
- Ensure that the Coast Guard required safety equipment is on board and functions.

1. SAFETY/WARNING REFERENCES

EXPLANATION OF SAFETY/WARNING REFERENCES

The most important aspect of boating is safety. Although every effort is made to address the numerous issues regarding the safe usage of your boat, it is strongly recommended that you avail yourself to the training and knowledge available through boating safety courses, etc.

SAFETY PRECAUTIONS

The precautions below appear throughout this manual and must be observed when operating or servicing your boat. Learn to recognize the degree of precaution and understand the explanations of safety prior to reading this manual. These precautions are not all-inclusive. Always use common sense in the operation of your boat.

⚠ DANGER

DANGER - Immediate hazards which WILL result in severe personal injury or death if the warning is ignored.

⚠ WARNING

WARNING - Hazards or unsafe practices which MAY result in severe personal injury or death if the warning is ignored.

⚠ CAUTION

CAUTION - Hazards or unsafe practices which could result in minor injury, product or property damage if the warning is ignored.

NOTICE

Information which is important to proper operation or maintenance, but is not hazard related.

WARNING LABELS

Mounted at key locations throughout your boat are warning labels which advise the owner/operator of imperative safety precautions to follow when operating and / or servicing equipment.

- Do not remove or obstruct any safety label.
- Replace any label which becomes illegible. Replacement safety labels can be obtained by calling your dealer.

The examples below indicate the level of hazard by color and explanation.

⚠ DANGER

DANGER - Immediate hazards which WILL result in severe personal injury or death if the warning is ignored.

⚠ WARNING

WARNING - Hazards or unsafe practices which MAY result in severe personal injury or death if the warning is ignored.

⚠ CAUTION

CAUTION - Hazards or unsafe practices which could result in minor injury, product or property damage if the warning is ignored.

NOTICE

Information which is important to proper operation or maintenance, but is not hazard related.

2. LEGALLY MANDATED MINIMUM REQUIRED EQUIPMENT

Consult your national boating law enforcement agency.

The following equipment is the minimum required by the U.S. Coast Guard.

Personal Flotation Devices (PFD's): One Coast Guard approved Type I, II or III device is mandatory for each person aboard. One throwable Type IV device is also required to be on board. A Type V device is acceptable if worn for approved use, (see page 1.5 for a description of these PFD classifications). **Always wear a PFD when boating.**

Fire Extinguisher - Portable:

The USCG requires that for a boat 26' to less than 40' [7.9 meters to less than 12.2 meters] in length with a fixed fire extinguishing system installed in the engine and generator spaces, **one (1) Type B-1** fire extinguisher be on board. For a boat 40' to less than 65' [12.2 meters to less than 19.8] in length with a fixed fire extinguishing system installed in the engine and generator spaces, **two (2) type B-1 or one (1) type B-2** fire extinguishers are required.

The ABYC recommends that for a boat 26' to less than 40' [7.9 meters to less than 12.2 meters] in length you have **three (3) Type B-1** ABC fire extinguishers on board. For a boat 40' to less than 65' [12.2 meters to less than 19.8] in length, **four (4) Type B-1 ABC** fire extinguishers are recommended. Extinguishers should be located outside the engine compartment, in the crews quarters, at the helm station, in the galley or in the passenger cockpit area.

Whistle, Horn: You must have on board some means of making a loud sound signal, for example, whistle or horn.

Visual Distress Signals: If you operate your boat in coastal waters or on the Great Lakes, you must have visual distress signals for day and night use on board. At least three (3) U.S. Coast Guard approved pyrotechnic devices marked with date showing service life must be carried, readily accessible, in serviceable condition and not expired. Store pyrotechnic signals in a well-marked waterproof container in a dry location.

Other: Your Sea Ray® is equipped with the required navigation lights, engine exhaust and ventilation systems.

3. Fire Extinguishing System

Your boat is equipped with an automatic fire extinguishing system located in the engine compartment. In the event of a fire, the heat sensitive automatic head in the engine compartment will release a fire-extinguishing vapor, totally flooding the area.

The helm switch panel contains an indicator light for the automatic fire extinguishing system. The light will be ON when the ignition is on and indicates that the system is ready. If the light goes out while the ignition is on, the system has discharged.

IF A DISCHARGE OF THE AUTOMATIC FIRE EXTINGUISHING SYSTEM OCCURS, IMMEDIATELY SHUT DOWN ALL ENGINES, POWERED VENTILATION, ELECTRICAL SYSTEMS AND EXTINGUISH ALL SMOKING MATERIALS. DO NOT IMMEDIATELY OPEN THE ENGINE COMPARTMENT!! THIS FEEDS OXYGEN TO THE FIRE AND THE FIRE COULD RESTART.

Wait at least fifteen (15) minutes before opening the engine compartment. This gives the compartment long enough for hot metals and fuels to cool. Have portable extinguishers at hand and ready to use in case the fire reignites. Do not breathe fumes or vapors caused by the fire.

4. Carbon Monoxide

Symptoms of carbon monoxide poisoning are dizziness, ears ringing, headaches, nausea and unconsciousness. Because carbon monoxide gas (CO) is odorless, colorless and tasteless, it is unlikely to be noticed until a person is overcome.

⚠ DANGER

Fumes from engine, generators, and other equipment and appliances using burning fuel contain carbon monoxide.

Carbon Monoxide can kill you.

Open all doors, curtains, windows, and hatches to let fresh air circulate, when running engine, generator or burning any fuel when boat is anchored, moored or docked.

⚠ DANGER

Even in rainy cold weather ventilation must be maintained to avoid Carbon Monoxide poisoning. You will get wet and/or cold.

⚠ DANGER

Sleeping on boat requires an operating Carbon Monoxide detection system in each sleeping location.

Dangerous concentrations of carbon monoxide will be present if:

- the engine and/or generator exhaust systems leak;
- insufficient fresh air is circulating where people are present; and/or
- fumes move from the rear of the boat into the cockpit and cabin area.

Page 1.4 shows examples of a boat operating in conditions that can lead to high concentrations of carbon monoxide gas.

To minimize the danger of CO accumulation when the engine is running, or using burning fuel applications:

- Be sure to have sufficient ventilation when using canvas or window-type side curtains when underway, anchored, moored or docked.

- If a convertible top is installed, operate with the forward hatch open.
- Operate all burning fuel appliances, such as charcoal, propane, LPG, CNG or alcohol cooking devices in areas where fresh air can circulate. Do not use such devices where there is no noticeable air movement, especially in the cabin, when anchored, moored or docked.
- Do not idle engine without moving boat for more than 15 minutes at a time.
- Inspect the exhaust system regularly.

If CO poisoning is suspected, have the victim breath fresh air deeply. A victim often revives, then relapses because organs are damaged by lack of oxygen. Seek immediate medical attention.

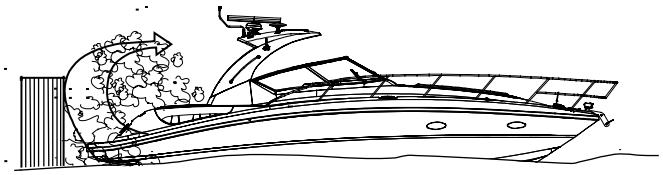
CARBON MONOXIDE MONITOR

Your boat has carbon monoxide (CO) monitors mounted inside the boat. The CO monitor is an electronic instrument that detects CO. When there is a buildup of CO, the monitor will alert the occupants by a flashing DANGER light and alarm. The CO monitor is wired through a breaker on the Main Distribution Panel (MDP).

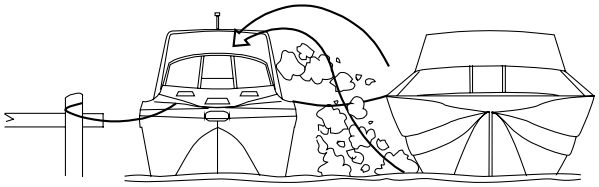
It is extremely important that you become totally familiar with your CO monitor and its functions.

Read and understand the CO monitor information and operating instructions located in your Owner's Information Package.

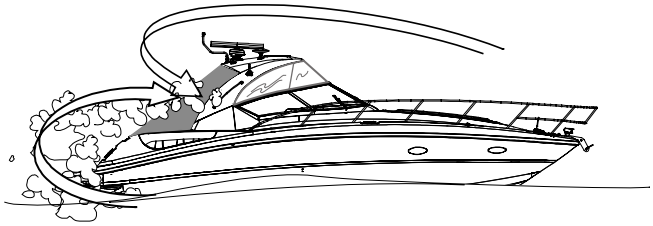
EXAMPLES OF HOW HIGH LEVELS OF CARBON MONOXIDE MAY ACCUMULATE (FIG. 1.4.1)



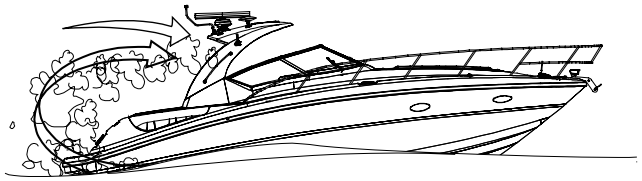
BLOCKING HULL EXHAUSTS. OPERATING AT SLOW SPEED OR DEAD IN THE WATER. ILLUSTRATION #A



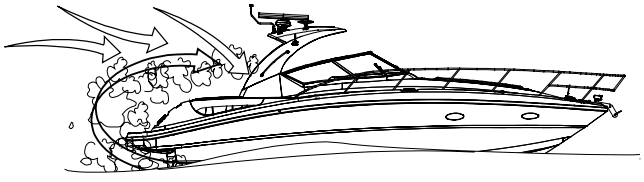
OPERATING ENGINE AND/OR GENERATOR IN CONFINED SPACES. ILLUSTRATION #D



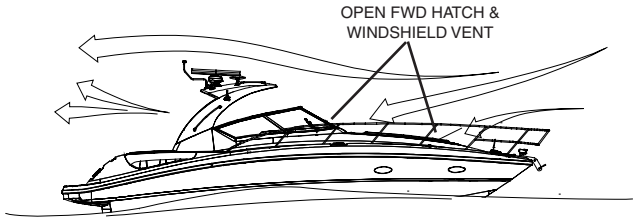
USING CANVAS CURTAINS. ILLUSTRATION #B



OPERATING WITH THE BOW HIGH. ILLUSTRATION #E



WINDS BLOWING EXHAUST TOWARD BOAT OCCUPANTS. ILLUSTRATION #C



GOOD VENTILATION. ILLUSTRATION #F

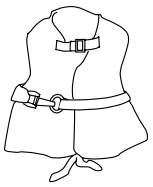
5. LIFESAVING EQUIPMENT

Even strong swimmers can tire quickly in the water and drown due to exhaustion, hypothermia, or both. The buoyancy provided by a personal flotation device (PFD) will allow the person who has fallen overboard to remain afloat with far less effort and heat loss, extending survival time necessary to find and retrieve them.

Boat operators are required to carry one wearable personal flotation device (Type I, II, III or V) for every person on board. Boats must also have at least one throwable device (Type IV). The law requires that PFDs must be readily accessible, if not worn. "Readily accessible" means removed from storage bags and unbuckled. But, children and nonswimmers must wear PFDs at all times when aboard. It is common sense to have everyone on board wearing PFDs. A throwable device must also be right at hand and ready to toss.

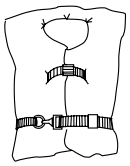
PFD CLASSIFICATIONS

(Fig. 1.5.1)



Off-Shore Life Jacket (Type I) – most buoyant, it is designed to turn an unconscious person face up; used in all types of waters where rescue may be slow, particularly in cold or rough conditions.

(Fig. 1.5.2)

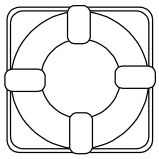


Near-Shore Life Vest (Type II)– "keyhole" vest with flotation-filled head and neck support is also designed to turn a person face up, but the turning action is not as pronounced; used in calm, inland waters or where quick rescue is likely.

(Fig. 1.5.3)

Flotation Aid (Type III) – vest is designed so conscious wearers can turn face up; often designed for comfort while engaged in sports such as skiing.

(Fig. 1.5.4)



Throwable Devices (Type IV)– horseshoe buoys, ring buoys and buoyant cushions are designed to be grasped, not worn.

(Fig. 1.5.5)

Special-Use Devices (Type V)– sailboat harnesses, white-water vests, float coats, and hybrid vests which have minimum inherent buoyancy and an inflatable chamber.

Before purchasing PFDs, ensure that there is an attached tag indicating they are approved by the U.S. Coast Guard or by your national boating law enforcement agency.

Children and nonswimmers must wear PFDs at all times when aboard. All passengers and crew should wear them. A loose PFD is often useless in an emergency.

The operator is responsible for instructing everyone aboard on the location and use of PFDs.

Size PFDs for the wearer. Children require special attention in the use of PFDs.

Test PFD buoyancy at least once a year.

6. Recommended Equipment for Safe Operation

In addition to legally mandated equipment, the following items are recommended for safe boating.

- Anchors, chain and line, (the anchors must be properly sized for your boat. Ask your boat dealer or marine supply store for recommendations)
- Batteries for flashlights and portable electronic devices.
- Boat hook
- Charts of your intended cruising area
- Compass
- Emergency position-indicating radio beacon (EPIRB)
- Extra propeller(s)
- Fenders
- First aid kit
- GPS or Loran position locating devices
- Lubricating oil
- Manual bilge pump
- Manuals for engine and accessories
- Marine VHF radio with weather channels
- Moisture repellent
- Mooring lines
- Spare keys
- Spare parts kit (spark plugs, fuses, hose clamps and ask your dealer to recommend other parts)
- Spotlight, if you intend to boat at night
- Sunscreen
- Tool kit:
  - Assorted screwdrivers (Phillips and flat blade)
  - Electrical tape and duct tape
  - Hammer
  - Pliers (regular, vise-grip, and tongue & groove)
  - Socket set (metric or U.S. Standard)
  - Utility Knife
  - Wrenches (box, open-end, allen, adjustable)
- Visual distress signals for day and night use (required in some areas; consult local regulations)
- Waterproof flashlight(s)

7. Stability

Your boat was manufactured to specific stability and flotation standards for the capacity shown on the certification plate. Any increase from the recommended load capacities will put your boat in jeopardy of capsizing, swamping and/or sinking.

In Addition:

- Stability may be substantially reduced if equipment is added above the deck.
- Stability is substantially reduced by loose fluids or weight within the hull. Keep bilge area as dry as possible, and close all openings, hatches and windows in rough weather.

⚠ WARNING

Distribute passengers and gear as uniformly as possible from front to rear and left to right.

The manufacturer's load rating is the maximum allowed under calm conditions.

Reduce boat loading if weather, water or other conditions are adverse.

8. Maintain Control

On the water there are no marked traffic lanes, no traffic signs or lights, and boats have no turn signals. The boat operator must keep his or her attention focused not only on what's ahead but what's on the left, right and behind the boat.

The operator must always be alert to approaching boats (from the rear, right and left sides, as well as those ahead). There can be people in the water, partially submerged debris, and other navigational hazards such as rocks, sand bars, dangerous currents, to name a few.

Your passengers are relying on you to operate and maneuver the boat safely so that they are not in danger of going overboard. If you turn too quickly, increase or decrease speed abruptly, your

passengers are at risk of being thrown overboard or thrown about the boat.

When visibility becomes impaired because of weather, time of day or high bow angle you must slow down so that you have sufficient time to react if an emergency occurs. Nearby boats face similar risks in avoiding a collision with you.

⚠ WARNING

Death or serious injury can result if you fail to observe these safety rules:

- **Anyone who controls the boat must have taken a boating safety course and have trained in the proper operation of the boat.**
- **Always operate the boat at speeds that will not put people or property in danger.**
- **Be constantly aware of conditions in all directions when underway and before turning.**
- **Reduce speed, use a lookout to identify possible hazards or difficulties, and turn on navigation lights when:**
  - visibility is impaired;
  - in rough water; or
  - in congested waterways.
- **Watch your wake. It can capsize a small boat or damage moored boats or other property. You are responsible for damage caused by your wake.**

General Considerations:

- Know how your boat handles under different conditions. Recognize your limitations and the boat's limitations. Modify speed in keeping with weather, sea and traffic conditions.
- Instruct passengers on location and use of safety equipment and procedures.
- Instruct passengers on the fundamentals of operating your boat in case you are unable to do so.
- You are responsible for passenger's actions. If they place themselves or the boat in danger, immediately correct them.

9. Load Capacity

If present the capacity information plate, located near the helm indicates maximum weight and number of persons your boat can handle under calm sea conditions. Do not exceed the load capacities stated. The number of people on board must be reduced if you go out in poor weather and rough water.

The type of capacity plate will vary dependant upon the local governing authority.

A. United States – The United States Coast Guard only provides specific numbers for passenger capacity or cargo weight for recreational vessels up to 26', (7.9 meters).

B. Canada – Transport Canada only provides specific numbers for passenger capacity or cargo weight for recreational vessels up to 6 meters (19.7').

C. Australia – The Australian Transport Council provides specific numbers for passenger capacity and cargo weight for all recreational vessels.

D. European Union – CE regulations provide specific information for passenger capacity and cargo weight for all recreational vessels.

Use common sense and sound judgment when placing equipment and/or passengers in your boat. The number of people on board must be reduced if you go out in poor weather and rough water.

- The number of seats does not indicate how many people a boat can carry in poor weather and rough water.
- Above idle speed, all passengers must be seated in the seats provided.

10. POWER CAPACITY

Your boat's engine and accessories were selected to provide optimum performance and service. Installing a different engine or other accessories may cause unwanted handling characteristics. Should you choose to install a different engine or to add accessories that will affect the boat's running trim, have an experienced marine technician perform a safety inspection and handling test ***before*** operating your boat again. Certain modifications to your boat ***will*** result in cancellation of your warranty protection. ***Always*** check with your dealer ***before*** making any modifications to your boat.

11. PROPELLERS

Your Sea Ray® has been equipped with a propeller which our tests have shown to be the best suited for general use with our engine under normal conditions and load. Do not change the pitch of your propeller without getting your dealer's recommendations first. If you change to a different propeller pitch, **under no circumstances use a propeller which allows the engine to operate at higher than recommended RPM.** (Your engine manual specifies the maximum recommended RPM).

To maintain rated power, propellers should be free of nicks, excessive pitting and any distortions that alter them from their original design. Badly damaged propellers should be replaced, but those that are chipped, bent or merely out of shape can be reconditioned by your marine dealer.

It is advisable to carry extra propellers aboard in case you damage the one in use.

12. WEATHER

There are four design categories of boats based upon their ability to withstand wind and sea or water conditions:

A. Ocean
Wind speed: above 40 knots (46 mph)
Wave height: above 4 meters (13 feet)
Boat may be used for extended ocean voyages.

B. Offshore
Maximum wind speed: 40 knots (46 mph)
Maximum wave height: 4 meters (13 feet)
Boat can be used offshore, but not for extended ocean voyages.

C. Inshore
Maximum wind speed: 27 knots (31 mph)
Maximum wave height: 2 meters (6.5 feet)
Boat use is limited to coastal waters, large bays, estuaries, lakes and rivers.

D. Sheltered waters
Maximum wind speed: 15 knots (18 mph)
Maximum wave height: 0.5 meters (1.5 feet)
Boat use is limited to small lakes, rivers and canals.

⚠ DANGER

DO NOT ATTEMPT TO BOAT IN SEVERE WEATHER CONDITIONS

DEATH OR SERIOUS INJURY CAN OCCUR

GET TO SHORE BEFORE THE WEATHER TURNS BAD

All Sea Ray® Sport Yachts are Design Category B.

The wind speed and wave height specified as the upper limit for your category of boat does not mean that you or your passengers can survive if your boat is exposed to these conditions. It is only the most experienced operators and crew that may be able to operate a boat safely under these conditions. You must always be aware of weather conditions and head for port or protected waters in sufficient time to avoid being caught in high winds and rough water. Do not take chances!

Getting caught in severe weather is hazardous. Bad weather and/or rough sea or water conditions can cause an unsafe situation. Consult local weather information, or listen to the Nation Oceanic and Atmospheric Administration (NOAA) weather reports for the latest weather conditions or any impending deterioration of the weather before setting out and while underway. The following are a few basic weather-related rules:

- Check the weather forecast and the water conditions before leaving and while underway.
- A sudden change in wind direction or speed or an increase in wave height indicates deteriorating weather.
- Have everyone wear a personal flotation device.
- If a storm approaches, immediately seek a safe harbor.
- If a storm hits, have everyone sit in the cabin or on the cockpit deck in the boat. Head the bow into the wind with enough power to maintain slow headway.
- If you encounter fog, determine your position, set a safe course, slow down and alert other boats of your presence with a sound signal.
- If a lightning storm approaches, the safest action is to dock and disembark. If you cannot return to shore, have passengers go inside the cabin and remain there until the storm passes.
- Lightning seeks ground when it strikes. The best protection is a properly grounded lightning rod placed high enough over the deck to provide a protective umbrella over the hull. Depending upon the likelihood of your being in a lightning storm, consult your dealer for installation of a lightning rod. If caught in a storm, stay clear of the lightning rod, all attached wiring, and all metal parts of the boat.
- Stay out of the water during a lightning storm. If caught swimming during a storm, get back into the boat and remain there until the storm passes.

13. CHART YOUR COURSE

⚠ WARNING

Hitting an object in or under the water or boating in dangerous currents can cause serious injury or death to boat occupants.

You must know where the hazards are and avoid them.

In uncharted waters, boat very slowly and post a lookout.

To avoid boating in unsafe areas where there are underwater obstructions, shallow water, unnavigable conditions such as dangerous currents, and others, you must chart a course. This means having and using the NOAA charts for coastal waters, observing and understanding all navigational aids, using the knowledge and guidance of experienced boaters, and being aware of the tide times where appropriate.

If you are in an unfamiliar area without knowledge of the hazards, proceed very slowly and have someone watch for hazards.

Let others know where you are going. A float plan describes your intended cruising course and itinerary, boat description, and your expected time and date of return. Give the float plan to a friend or relative, so they can give the information to a national boat agency, like the U.S. Coast Guard, in the event you fail to return.

⚠ WARNING

Shut engine off if an object is struck or if you run aground.

Check for hull leaks and drive line damage, before restarting engines.

Use hand pump if bilge pumps don't remove water.

Boat very slowly, if you must proceed with a damaged drive line.

14. IMPAIRED OPERATION

Drugs and/or alcohol will prevent you from operating your boat safely. This single factor is involved in more marine accidents and deaths than any other. The detrimental effects of alcohol and drugs are increased by the wind, waves and sun, quickly impairing your ability to react properly and promptly in an emergency.

⚠ WARNING

Drugs and/or alcohol impair the operator's ability to control the boat safely.

Death or serious injury can result from improper boat operation.

15. WATER SPORTS

⚠ WARNING

Your boat can kill or injure persons in the water.

Always stay away from areas designated for swimming or diving. Unless you are towing a skier, stay away from water ski areas. Recognize markers used for such areas.

When engine is running, close and lock transom door and do not permit anyone to use boarding ladder or swim platform.

A. SWIMMING

- Do not permit anyone to swim from a moving boat, or a boat with an engine running.
- Many localities prohibit swimming from boats except in designated areas.
- Make sure boat's engines are turned off before allowing people to swim anywhere near your boat. Shut the engine OFF and remove the key from the ignition switch so that no one can accidentally start the engine while swimmers are nearby.
- Turn off engines when taking swimmers or skiers aboard or when they are entering the water. Never permit use of the transom or swim platform while engines are running.
- Slow down and look for swimmers or skiers when cruising in an area where there might be persons in the water.

B. SKIING

⚠ WARNING

Skiers must wear an approved PFD.

While it is unlikely that anyone would ski behind your Sea Ray® Sport Yacht, it is advised that you become familiar with water skiing safety and hand signals as you will likely, on occasion, find yourself in the vicinity of water skiing activity, (Fig. 1.11.1)

- Anyone who water skis must know how to swim.
- Never drive the boat directly behind a water skier. At 22 knots (25 m.p.h.), it takes only 5 seconds to overtake a fallen skier who was 60 meters (200 feet) in front.
- Keep a downed skier in sight and on the operator's side of the boat when approaching the skier. Never back up to anyone in the water.
- Learn the signals to communicate with a skier. The skier is to control the boat through hand signals.

  Turn – Arm raised, circle with index finger extended.

  Skier in Water – Extend one ski vertically out of water.

  Back to Dock – Pat top of head.

  Cut Motor – Draw finger across throat.

  Slow Down – Thumb pointed down or palm down, move hand up and down.

  Faster – Thumb pointed up or palm up, move hand up and down.

  OK – Raise arm and form a circle with thumb and index finger.

  Stop – Raise arm with palm vertical and facing forward.

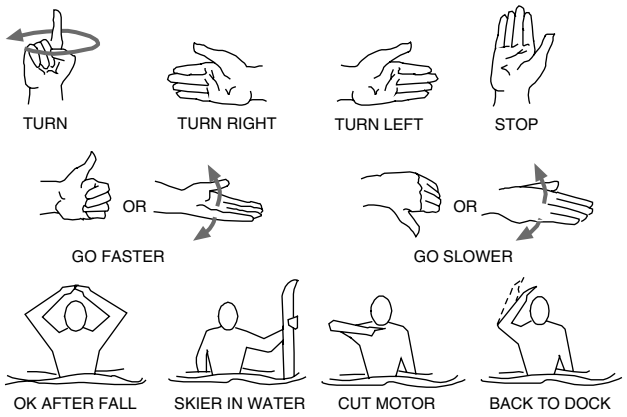
  Turn Right – Extend arm out from body to the right.

Turn Left – Extend arm out from body to the left.

OK After a Fall – Clasp hands together overhead.

- If the skier suddenly releases the tow rope, it can backlash into cockpit. Spotters who are watching the skier must be aware of this fact and be prepared to deflect the rope by hand to avoid injury.

SKIING SIGNALS
(FIG. 1.11.1)



C. DIVING

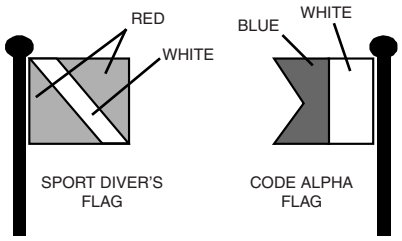
- Recognize and respect diving flags. Keep at least 30 meters (100 feet) away.

  Sport Diver's Flag – Red flag with diagonal white stripe marks a diver in the water.

  Code Alpha Flag – Blue and white pennant designates boat being used in dive operations.

IN GENERAL

DIVERS FLAGS
(FIG. 1.11.2)



When engaged in water sports, be safe and courteous to others sharing the water:

- Be considerate to fishermen.
- Do not water ski in congested areas.
- Keep the boat and skier away from navigation markers.
- Stay well clear of other boats and skiers.

16. EMERGENCY SITUATIONS

Prevention is the safest approach. We hope that you are never involved in an emergency situation.

If you are involved in an emergency situation, it is imperative that you know how to react, in order to protect the lives in your care.

NOTICE

All boaters have a legal obligation to help other boaters who are in distress, as long as rendering assistance does not endanger you, your passengers or your boat.

A. MEDICAL EMERGENCY

You may be far from professional medical help when you are boating. At least two people on board your boat should be CPR certified, and should have taken a first aid course. Equip your boat with a first aid kit.

B. WATER RESCUE

A person who has fallen overboard will die from hypothermia in water temperatures below 70°F if not rescued quickly. Water rescue consists of three steps: returning to the victim, making contact with the victim, and getting the victim back on board.

RETURNING TO THE VICTIM

- Immediately make everyone aware of the incident and keep the victim in sight.
- Slow the boat and keep pointing toward the person overboard. At night, direct the best available light source at the person.
- Throw a life preserver, even if the person is wearing a PFD. It will serve as another marker.

MAKING CONTACT

- Stop or slow the boat and circle toward the victim.
- Try to approach heading into the wind or into the waves.
- Keep the victim constantly in sight.
- When almost alongside, stop the engine in gear to prevent propeller "windmilling."

GETTING BACK ABOARD

- Try to reach the victim with a pole, or by throwing a life preserver. Do not swim to rescue the victim, except as a last resort.
- Assist the person in boarding the boat. The person should normally be brought in over the stern.
- If the person is injured or cannot get into the boat, a rescuer should put on a PFD with a safety line attached to the boat and enter the water to assist the victim.
- Handle the victim with care. Spinal injuries may have occurred.

C. FIRE

Fire is a serious boating hazard. Boats will burn quickly. Do not remain on board and fight a fire for more than a few minutes. If the fire cannot be extinguished within a few minutes, abandon the boat.

Have fire extinguishers handy. A small fire can be extinguished quickly with the right size and type of fire extinguisher.

- Extinguish smoking materials, shut off blowers, stoves, engines and generators.
- Throw burning materials overboard, if possible.
- If the fire is accessible, empty the contents of fire extinguishers at the base of the fire.
- If the fire is in the engine compartment and you have an automatic extinguisher for the engine, wait 15 minutes before opening the compartment. Have a portable extinguisher ready in case the fire flares up.
- Signal for help.
- Grab distress signals and survival gear. Put on PFDs. Prepare to abandon ship.

D. FLOODING, SWAMPING AND CAPSIZING

In the event of flooding, swamping or capsizing:

- Try to shut off engines, generators and blowers, before leaving the boat.
- Have everyone put on PFD.
- Account for all who were on board.
- If the boat is floating stay with the boat. Hang on, or climb on the boat and signal for help.
- Only as a last resort should you attempt to swim to shore - it is further away than it looks and you can tire and drown.

E. Collisions and Leaking

In the event of collision and leaking:

- Slow down or stop to reduce water intake, unless maintaining speed will keep the hole above water.
- Switch on bilge pumps.
- If equipped, operate the manual bilge pump if the powered bilge pumps can't handle the water flow.
- Account for everyone on board and check for injuries.
- Have everyone put on PFDs.
- Stay with the boat.
- Signal for help.
- If a leak patch is attempted, it should be done from the outside.
- In the event of a collision, you are required to file an accident report. Contact a state enforcement agency or the nearest Coast Guard office. If you are boating outside of U.S. waters, consult the nation you are visiting for accident reporting requirements.

F. Grounding

In the event of running aground:

- Check for leaks. If water is coming in, stop the intake of water before attempting to get the boat free.
- Inspect for damage to the hull, propulsion and steering systems.
- Determine if the tide, wind and current will drive the boat harder aground or will help to free it.
- Determine the water depth all around the boat, and the type of bottom (sand, mud, rocks, etc.). If it can be done without exposing persons to risk of injury, the boat should be moved away from hard obstructions and toward open water with soft ground.
- Do not attempt to have your boat towed by other than a trained and competent service, such as the Coast Guard or a salvage company. Recreational craft are not designed to tow other recreational craft.

G. Propulsion, Control or Steering Failure

If the drive train fails, or controls or steering do not respond properly at all:

- Shut off engine.
- Put out the anchor to prevent drifting.
- Determine whether or not you can repair the problem yourself. See the proper manuals for assistance in troubleshooting the engine, steering and engine controls.
- If you are not sure you can fix the problem, or if conditions are adverse, signal for help.

17. Safety Hot Lines

The safety information in the preceding pages gives only the general areas of concern for boating safety. It is not intended to be, nor can it be, exhaustive. You must take a boating safety course, and get hands-on instruction in the proper and safe operation of your boat from experienced persons before cruising.

The U.S. Coast Guard offers many pamphlets on safety and other information not covered in this book. Contact your local Coast Guard unit or call the toll-free safety hot lines below for information.

- U.S. Coast Guard 1-800-368-5647
- Canadian Coast Guard 1-800-267-6687

In other countries, ask your marine dealer for information on how to contact the national boating law enforcement agency.

18. ENVIRONMENTAL CONSIDERATIONS

The following warning is offered for boats sold in the State of California in accordance with California Health & Safety Code §§ 25249.5-.13:

⚠ WARNING

A wide variety of components used on this vessel contain or emit chemicals known to the State of California to cause cancer and birth defects and other reproductive harm.

EXAMPLES INCLUDE:

• Engine and generator exhaust

• Engine and generator fuel, and other liquids such as coolants and oil, especially used motor oil

• Cooking fuels

• Cleaners, paints, and substances used for vessel repair

• Waste materials that result from wear of vessel components

• Lead from battery terminals and from other sources such as ballast or fishing sinkers

TO AVOID HARM:

• Keep away from engine, generator, and cooking fuel exhaust fumes.

• Wash areas thoroughly with soap and water after handling the substances above.

A. FUEL AND OIL SPILLAGE

Regulations prohibit discharging fuel or oily waste in navigable waters. Discharge is defined as any action which causes a film, sheen or discoloration on the water surface, or causes a sludge or emulsion beneath the water surface. A common violation is bilge discharge. Use rags or sponges to soak up fuel or oily waste, then dispose of it properly ashore. If there is much fuel or oil in the bilge, contact a knowledgeable marine service to remove it. Never pump contaminated bilge discharge overboard. Help protect your waters.

Fill tank(s) less than rated capacity. Allow for fuel expansion.

B. WASTE DISPOSAL

- Many areas prohibit overboard sewer discharge. Close and disable flow-through waste systems to prevent discharge in such areas.
- Bag all refuse until it can be disposed of ashore. Regulations prohibit disposal of plastic anywhere in the marine environment and restrict other garbage disposal within specified distances from shore.

NOTICE

- **There is a possibility of being fined for having an operable direct overboard discharge of waste in some waters. Removing seacock handle, in closed position, or other means must be used to avoid fine.**
- **It is illegal for any vessel to dump plastic trash anywhere in the ocean or navigable waters of the United States.**

⚠ CAUTION

FOR BOATS WITH VACUFLUSH® HEADS ONLY

Do not place facial tissues, paper towels or sanitary napkins in head. Such material can damage the waste disposal system and the environment.

C. EXCESSIVE NOISE

Many areas regulate noise limits. Even if there are no laws, courtesy demands that boats operate quietly.

D. WAKE / WASH

Power boat wakes can endanger people and vessels. Each power boat operator is responsible for injury or damage caused by the boat's wake. Be especially careful in confined areas such as channels or marinas. Observe "no wake" warnings.

⚠ WARNING

SPEED HAZARD - Watch your wake. It might capsize a small craft. You are responsible for damage caused by your wake.

⚠ CAUTION

Reduce speed in congested waterways.

Be alert for NO WAKE markers.

19. INTERNATIONAL REQUIREMENTS

Depending on your boat's original destination, the vessel and its systems may have been constructed in accordance with standards and specifications published by various international authorities such as:

- Construction Standards for Small Vessels - Canada
- Recreational Craft Directive and applicable ISO Standards - European Union
- AS/NZ 3004 Electrical Installations - Australia/ New Zealand

Further information concerning these requirements may be obtained from your local dealer.

20. NAUTICAL TERMS

Abaft – a point on a boat that is aft of another.

Abeam – object 90 degrees to center line on either side of boat.

Aft – toward the rear or stern of the boat.

Beam – the width of a boat.

Bow – the fore part of a boat.

Bow Eye – bolt with looped head mounted on extreme forward part of bow.

Bulkhead – vertical partition in a boat.

Chine – meeting juncture of side and bottom of boat.

Chock – deck fitting, used as guides for mooring or anchor lines. Also, a wedge to stop wheels from rolling.

Cleat – deck fitting with arms or horns on which lines may be made fast.

Cockpit – an open space from which a boat is operated.

Deck – upper structure which covers the hull between gunwales.

Draft – depth of water required to float boat and its propulsion system.

Fathom – six feet.

Fenders – rope or plastic pieces hung over the side to protect the hull from chafing.

Freeboard – height of exposed hull from water line to deck.

Ground tackle – general term referring to anchors, anchor lines, etc.

Gunwale (pronounced gun'l) – meeting juncture of hull and deck.

Hatch – an opening in deck to provide access below.

Head – toilet or toilet area in a boat.

Headroom – vertical distance between the deck and cabin or canopy top.

Helm – steering console.

Hull – the basic part of a boat that provides buoyancy to float the weight of the craft and its load.

Keel – the major longitudinal member of a hull; the lowest external portion of a boat.

Knot – unit of speed in nautical miles per hour.

Lee – the side that is sheltered from the wind.

PFD – Personal Flotation Device; life preserver.

Port – term designating left side of the boat.

Rudder – movable fixture at the stern used for steering.

Scupper – hole permitting water to drain overboard from deck or cockpit.

Sheer – curve or sweep of the deck as viewed from the side.

Snub – to check or tighten a line suddenly.

Starboard – term designating right side of the boat

Stern – the aft end of a boat.

Stern drive – outboard unit of an inboard/outboard (I/O) engine installation.

Stringer – longitudinal members fastened inside the hull for additional structural strength.

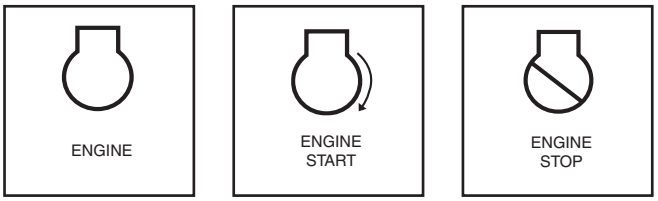
Transom – transverse part of stern.

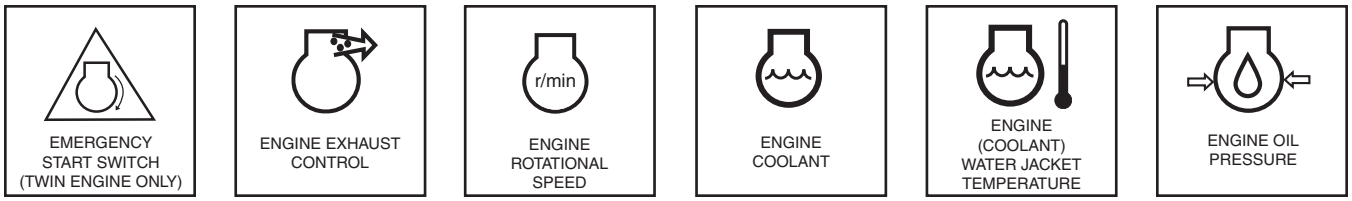
Wake – disturbed water that a boat leaves behind as a result of forward motion.

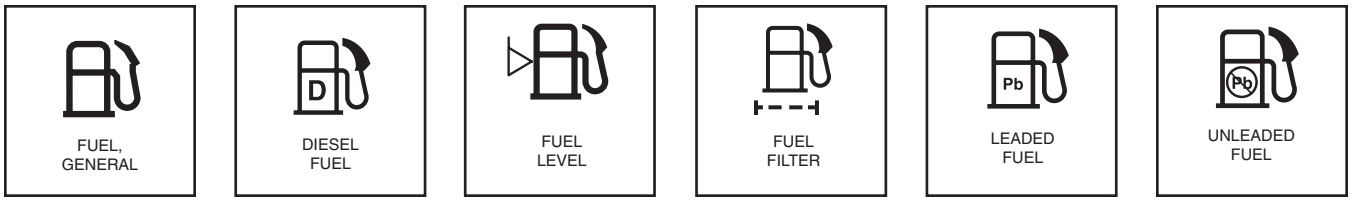
Windward – toward the direction from which the wind is blowing.

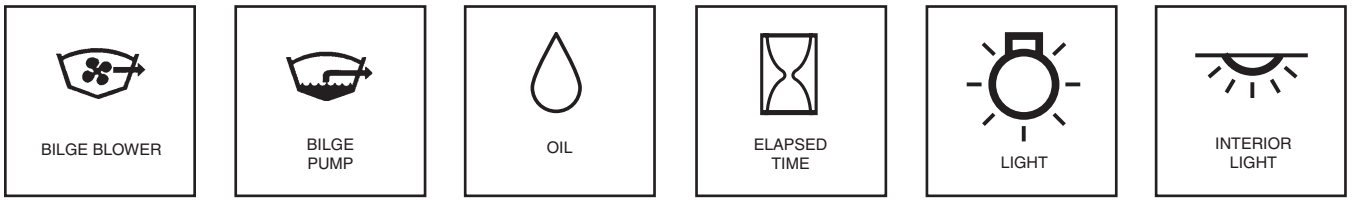
21. KEY TO SYMBOLS ON CONTROLS AND PRINTS

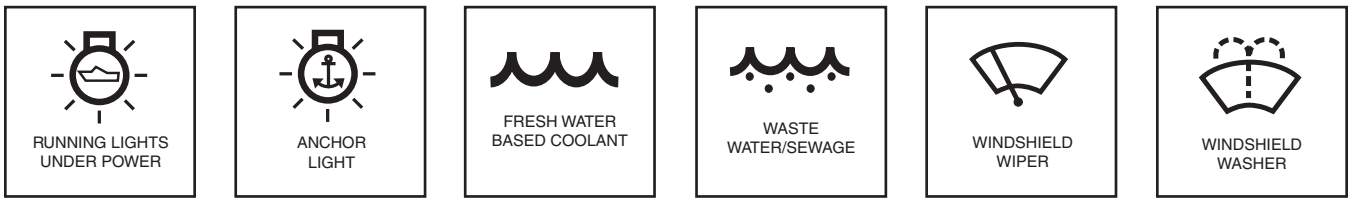
These symbols may be found on your controls and gauges and/or used in this owner's manual. This page is to help you understand what the symbols mean.

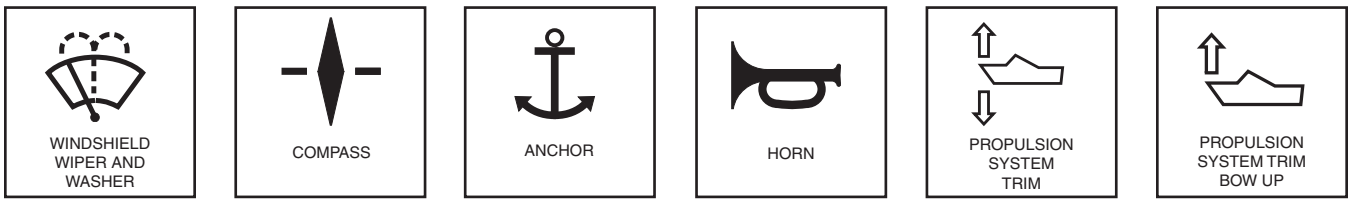


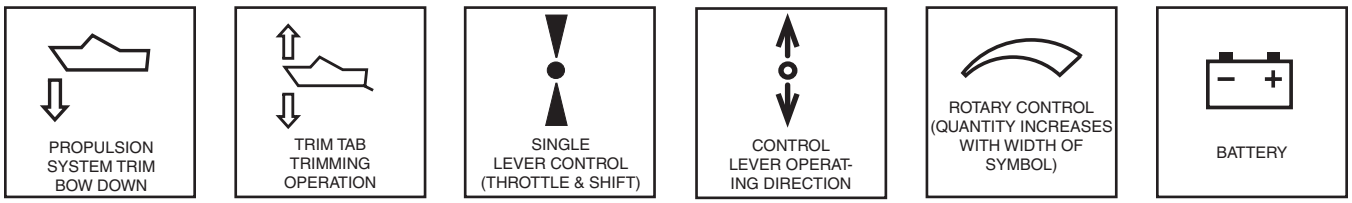


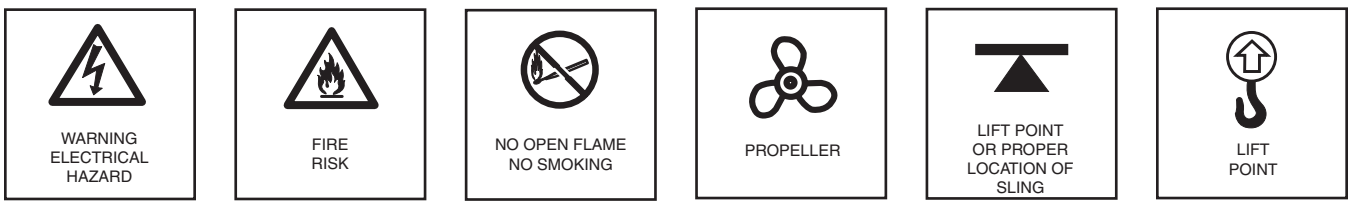









PROPULSION SYSTEM TRIM BOW DOWN
TRIM TAB TRIMMING OPERATION
SINGLE LEVER CONTROL (THROTTLE & SHIFT)
CONTROL LEVER OPERATING DIRECTION
ROTARY CONTROL (QUANTITY INCREASES WITH WIDTH OF SYMBOL)
BATTERY



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1. DOCKING/LIFTING/STORAGE

A. BOW AND STERN CLEATS

⚠ CAUTION

Do not use cleats for lifting.

Cleats must not be used for lifting the boat, they are intended for docking or mooring use only.

When lifting the boat always keep the bow higher than the stern to drain the exhaust lines and to prevent water from running forward through the manifold and into the engine where it can become trapped. It may seem expedient to lift only the stern when changing a propeller, but this can result in water entering the engine cylinders, causing hydrostatic lock and resulting in possible engine failure. Even a small amount of water in the engine can cause rust and is to be avoided.

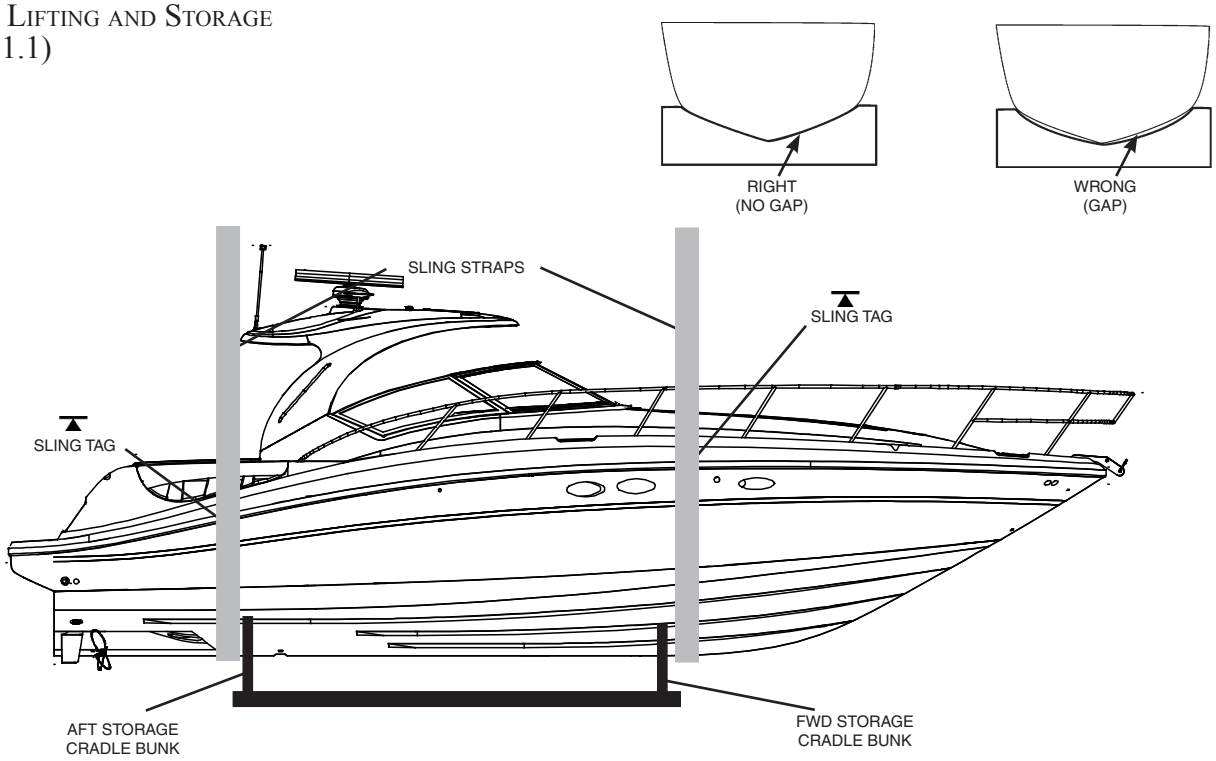
With fiberglass boats, severe gelcoat crazing or more serious hull damage can occur during launching and hauling if pressure is created on the gunwales by the slings. Flat, wide belting-type slings and spreaders long enough to keep pressure from the gunwales are necessary. Cable-type slings should be avoided. Do not place the slings where they may lift on the propeller shaft or other underwater fittings. The slings should be placed directly over the sling tags imprinted on the deck (Figure 2.1.1) to assure the least amount of stress on the hull.

Never hoist the boat with an appreciable amount of water in the bilge. Fuel and water tanks should preferably be empty, especially if of large capacity.

B. SUPPORTING THE BOAT

A cradle is the ideal support for the boat whenever it is not in the water. Properly designed and constructed, it will provide support at the proper points, which is essential to avoid stress on the hull. Boat placement on the cradle should line up as closely as possible to the sling tags on the side of the deck. Do not rest boat on underwater fittings.

PROPER LIFTING AND STORAGE
(FIG. 2.1.1)



See Specific Information Manual for proper dimensions and placement of bunks and straps for your boat

2. Passenger Locations

⚠ WARNING

Boat motion can be erratic.

You can fall overboard or be injured by hitting something in or on the boat.

All persons must be in cockpit area or cabin and be prepared for sudden boat movement.

Use front or bow deck area only during anchoring, mooring or emergencies.

⚠ WARNING

Wet decks are slippery.

You can be seriously injured if you slip and fall.

Wear slip resistant footwear secured to your feet and hold on to rails or boat structure.

1. When the boat is moving, all passengers must be in the cockpit area or cabin and must be on seating provided or, if standing, holding on firmly. While the person at the wheel must alert passengers before any sudden or erratic boat movement, such as crossing wakes, rapid turns, sudden acceleration or deceleration, etc., an emergency action may be necessary before passengers can be warned. All passengers must be prepared for rapid boat movement and be able to hold on to prevent loss of balance.
2. When persons are on the working deck area, for anchoring, mooring or in emergencies, they must be holding on and be positioned so as to prevent falling. In bad weather and/or rough water, if it is essential to be on deck, persons should be closely tied to cleats, railing stanchions or other securely fastened boat hardware.
3. Engines must be turned off if the boat is near swimmers or persons are on the swim platform or the swim ladder.

SEE THE SPECIFIC INFORMATION MANUAL FOR MORE ON PASSENGER LOCATIONS.

3. Description of Major Controls

A. Digital Throttle & Shift Control

Standard on the gasoline powered Sea Ray® Sport Yachts is the Digital Throttle and Shift control system (DTS). The DTS system will consist of a dual lever dash mounted control unit with engine controls on the unit and the start/stop switch panel mounted separately on the dash.

The DTS system functions similarly to a mechanical Shift and Throttle Control systems, however the DTS system uses electronic signals rather than push/pull cables to control the engine gear and speed. This makes shifting gears and adjusting speed much easier. When the control lever is centered the transmission is in NEUTRAL and the engine is throttle is at IDLE speed. As you move the lever forward the transmission engages in FORWARD gear; further forward movement increases the engine RPM's and the forward speed of the boat. Moving the lever back (aft) engages the transmission in REVERSE gear; further backward movement increases the engine RPM's and the rearward speed of the boat.

Starting the engines is also simplified by Start/Stop buttons located on the Throttle & Shift lever. Start the engines one at a time. To start an engine, press and release the Start/Stop button and the DTS system automatically starts the engine (without having to engage the Throttle Only function in order to pump fuel to start the engine). To stop an engine, simply press the Start/Stop button and the engine shuts off.

REFER TO THE PRODUCT OWNER'S MANUAL FOR COMPLETE OPERATING INSTRUCTIONS AND WARRANTY INFORMATION.

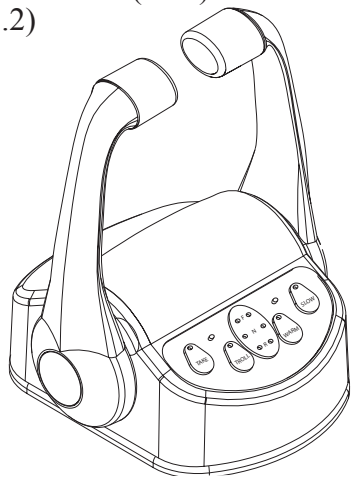
⚠ WARNING

Move throttle/shift controls to NEUTRAL before starting engines.

Reversing at high speeds can cause flooding/ swamping due to water being pushed over the transom.

MERCURY DUAL ENGINE DIGITAL THROTTLE & SHIFT (DTS) CONTROLS (FIG. 2.3.1)

GLENDINNING DUAL ENGINE ELECTRONIC THROTTLE & SHIFT (ETS) CONTROLS (FIG. 2.3.2)



NOTICE

Vessel will not start in gear. Check controls to ensure they are in neutral before attempting to start engines.

NOTICE

IN DTS SYSTEMS THE IGNITION KEY SWITCH LOCATION WILL VARY. PLEASE REFER TO THE SPECIFIC INFORMATION MANUAL FOR ITS LOCATION.

B. ELECTRONIC THROTTLE AND SHIFT CONTROL

The Cummins Mercury diesel powered Sea Ray® Sport Yachts use an Electronic Throttle and Shift control system (ETS). The ETS system operates similarly to the gasoline DTS system. Read and understand the information in the Owner's Manual Package for your sport yacht model's gear and throttle control.

REFER TO THE PRODUCT OWNER'S MANUAL FOR COMPLETE OPERATING INSTRUCTIONS AND WARRANTY INFORMATION.

⚠ CAUTION

Shift Quickly; easing into gear can damage the transmission.

C. JOYSTICK CONTROL SYSTEM

(Only available on CMD Zeus drive systems) the joystick provides an intuitive driver interface to maneuver the vessel. Operating the vessel with the joystick is well suited for close quarter operations and when docking. The joystick causes the computer control system to automatically calculate the steering angle of each drive, the throttle level, the proper shift and clutch slip percentage to push or rotate the boat in a direction corresponding to the joystick movement or twist. For example, if you move the joystick sideways, the computer control system applies a thrust to the boat in the sideways direction.

The following illustrations give some limited examples of the basic responses to inputs from the joystick. The joystick is proportional, which means that the farther from the center the joystick is moved, the more thrust is applied to the boat in that direction, up to a maximum of 1800 engine RPM.

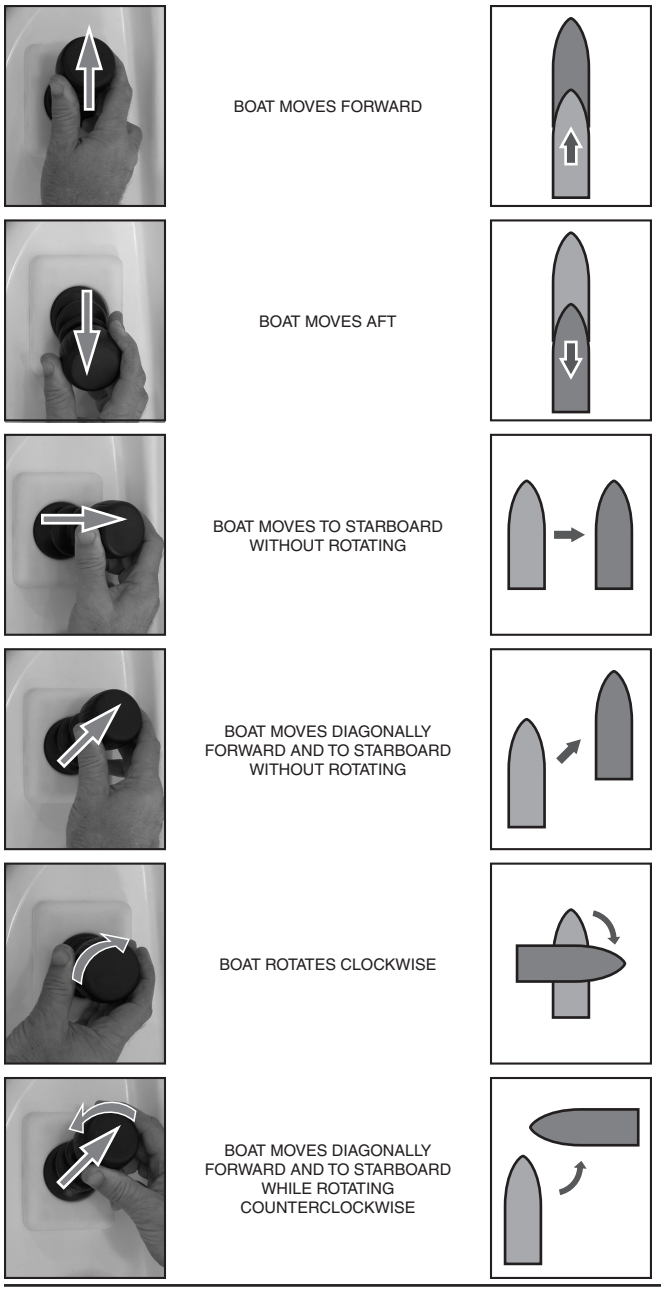
⚠ WARNING

ZEUS JOYSTICK CAN ENGAGE PROPELLERS WHEN THROTTLES ARE IN NEUTRAL. NEVER LEAVE ENGINES RUNNING WITH PEOPLE IN THE WATER. DEATH OR SERIOUS INJURY COULD RESULT. SEE OWNER'S MANUAL FOR SAFE OPERATING INSTRUCTIONS.

To maneuver the boat with the joystick:

1. Move both Shift/Throttle levers to the neutral position.
2. Move the joystick in the direction that you want the boat to move, or twist the joystick in the direction that you want the boat to rotate. The joystick can be moved and rotated at the same time. Use gentle joystick movements until you gain comfort with the thrust response.

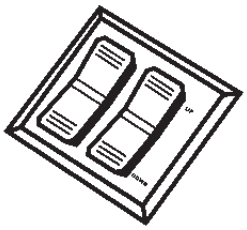
NOTE: To prevent drive engagement resulting from unintended movement of the joystick while the engines are running, press the "THROTTLE ONLY" button.


BOAT MOVES FORWARD
BOAT MOVES AFT
BOAT MOVES TO STARBOARD WITHOUT ROTATING
BOAT MOVES DIAGONALLY FORWARD AND TO STARBOARD WITHOUT ROTATING
BOAT ROTATES CLOCKWISE
BOAT MOVES DIAGONALLY FORWARD AND TO STARBOARD WHILE ROTATING COUNTERCLOCKWISE

D. HYDRAULIC TRIM TABS

The trim tabs on your Sea Ray® are operated with a rocker type momentary switch at the control station. They are protected by a circuit breaker on the control station breaker panel which must be ON to use the trim tabs .

TRIM TABS SWITCH (FIG. 2.4.1)



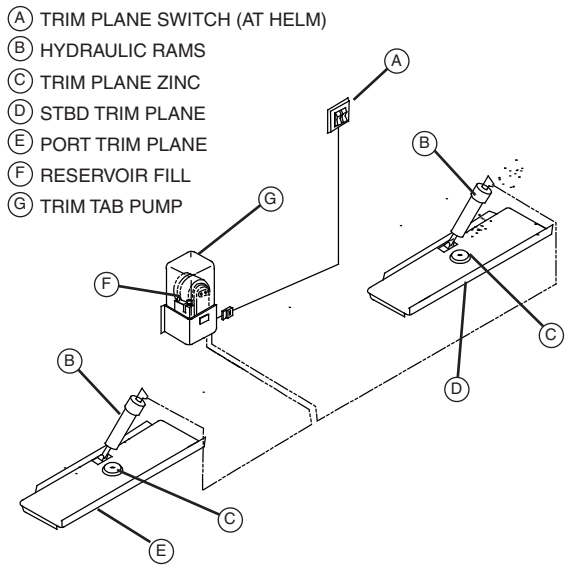
To trim the bow of your boat down, push the top halves of BOTH rockers down in momentary bursts. If you hold the rockers down, you will over trim the boat and the bow will dig in. To correct over trimming, push bottom halves of BOTH rockers to obtain desired planing angle.

RUNNING ATTITUDE	LIST	PUSH
BOW UP	.....	TOP OF BOTH ROCKERS
BOW UP	PORT	TOP OF STARBOARD ROCKER
BOW UP	STARBOARD	TOP OF PORT ROCKER
BOW DOWN	PORT	BOTTOM OF STARBOARD ROCKER
BOW DOWN	STARBOARD	BOTTOM OF PORT ROCKER

The trim tabs on the transom of your boat can also be used to trim the list of your boat (See chart above) that may be caused by improper storage of gear, too many people on one side or a strong cross wind. Operation of the rocker switch should be momentary bursts to achieve proper attitude of the hull.

When running wide open, most boats do not require any trim unless heavily loaded.

HYDRAULIC TRIM TABS
(FIG. 2.5.1)


A TRIM PLANE SWITCH (AT HELM)
B HYDRAULIC RAMS
C TRIM PLANE ZINC
D STBD TRIM PLANE
E PORT TRIM PLANE
F RESERVOIR FILL
G TRIM TAB PUMP

In heavy following seas or when running in an inlet, best maneuverability is obtained with a bow high attitude. To be sure the tabs are full up in the zero position, push the bottom halves of BOTH rockers for several seconds.

⚠ WARNING

MANEUVERING/CONTROL HAZARD

Ensure continuous visibility of other boats, swimmers, and obstacles during bow-up transition to planing.

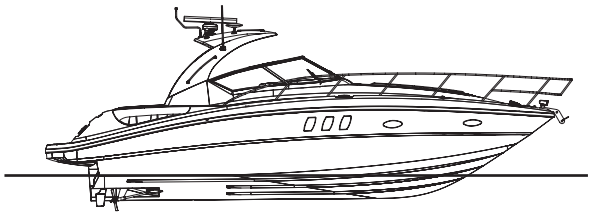
The trim tab pump is located in the aft portion of the bilge. To service the unit, remove the tinted plastic cover to gain access to reservoir fill plug and motor parts. Hydraulic trim tabs use type A Dexron II automatic transmission fluid, which should be filled up to the FULL mark on the pump base. **Add fluid with the trim tabs in the up position only.**

Your boat is designed to plane at a particular speed and weight distribution. As speed decreases or weight increases, the stern will settle lower in the water and the hull will create and push a hill of water, increasing drag and requiring more power to move through the water.

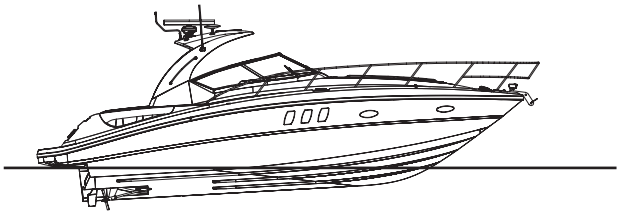
Hydraulic trim tabs are adjusted independently of each other, enabling adjustment of bow attitude up and down as well as to correct for side to side list. Trim tabs can also be used to provide attitude adjustment at lower speeds.

EFFECTS OF TRIMMING
(FIG. 2.5.2)

BOW-DOWN ("PLOWING")

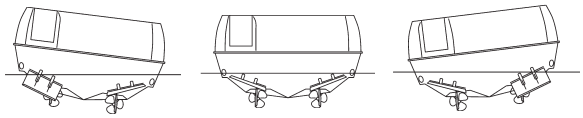


PROPER TRIM (3-5° BOW-UP ANGLE)



BOW-UP ("PORPOISING")

EFFECTS OF PORT AND STBD TRIM TAB ADJUSTMENT



PORT TAB DOWN	BOTH NEUTRAL	STBD TAB DOWN
PORT STERN UP STBD BOW DOWN	NO CHANGE IN LIST	STBD STERN UP PORT BOW DOWN

A PROPERLY TRIMMED BOAT:

- Operates at a correct running attitude of a 3 to 5 degree angle to the water (bow slightly up).
- Reduces drag and increases fuel efficiency.
- Preserves good forward visibility.
- Increases safety.

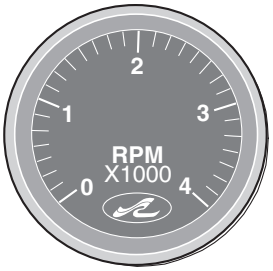
Use short bursts of rocker switches to adjust trim tabs. Pushing switches too far at once may cause sudden steering problems. Adjusting one trim tab more than the other will adjust list caused by improper equipment storage, too many people on one side or a strong cross wind.

REFER TO OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

4. IMPORTANT GAUGES

A. TACHOMETER

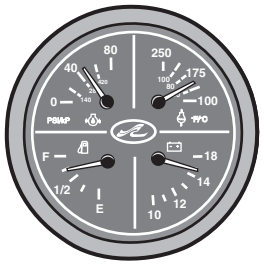
SMARTCRAFTTM SYSTEM TACH
(FIG. 2.6.1)



The tachometer indicates the revolutions per minute (RPM) of the engine. (It does not indicate the speed of the boat.) Your Engine Operator's Manual indicates the maximum full throttle RPM at which your engine should operate. This must not be exceeded or serious engine damage will occur. The tachometer should also be used to determine the most comfortable and economical cruising RPM.

B. 4-IN-1 MULTIGAUGE

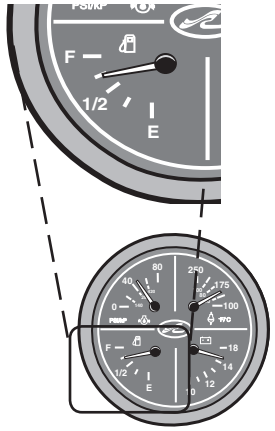
(FIG. 2.6.2)



Your Sport Yacht is equipped with a quad gauge unit which displays, in analog format, engine oil pressure, water temperature, voltage and respective port and starboard fuel tank levels.

FUEL GAUGE

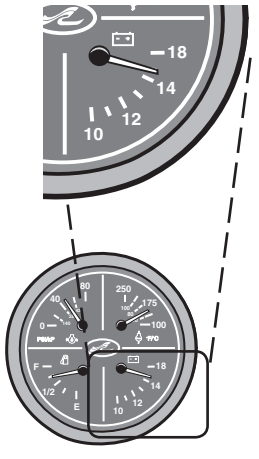
(FIG. 2.6.3)



The fuel gauge indicates the amount of fuel in the fuel tank. The most accurate reading of the fuel gauge is at idle speeds when your boat is in an approximately level position. At slow plane, when your boat is in a bow up position the gauge will read inaccurately because the fuel in the tanks travel to the rear of the tanks and away from the fuel sending unit. Because gauge readings are approximate, they should be compared to the hours of use versus known fuel consumption (GPH).

VOLTMETER

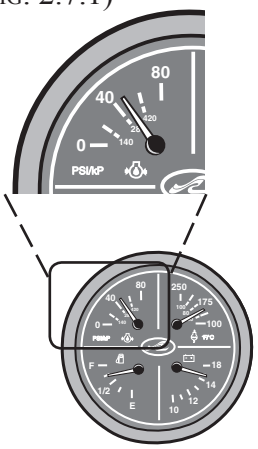
(FIG. 2.6.4)



The voltmeter gauge indicates battery bank voltage. Each engine operating voltage will range between 12.0 to 16.5 volts when the alternator is charging. Significantly higher or lower readings indicate a battery problem, alternator, malfunction, or heavy battery drain.

OIL PRESSURE GAUGE

(FIG. 2.7.1)

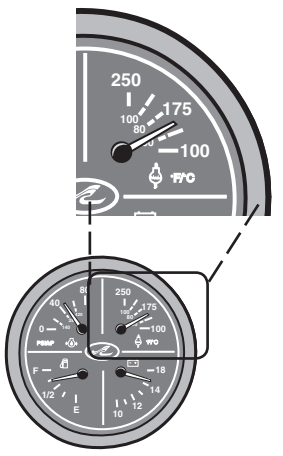


The oil gauge is often the best indicator of engine problems or difficulties. Maximum pressure is controlled by a preset valve in the oil pump. Note the reading which this gauge records after the break-in-period, as it is the "norm" which can be used as reference during the life of the engine. **IF A COMPLETE LOSS OF OIL PRESSURE OCCURS, TURN ENGINE OFF AT ONCE.** Continued running after loss of pressure will cause engine damage. First, manually check the oil level. If low oil level is not the cause, consult your Sea Ray® dealer. **DO NOT RESTART THE ENGINE UNTIL THE PROBLEM HAS BEEN CORRECTED.**

Slight fluctuations in gauge readings are not uncommon during operation and may be due to the characteristics of the lubricating oil. Greater fluctuations should be investigated. The cause may be a clogged oil filter element which should be replaced with every oil change.

WATER TEMPERATURE GAUGE

(FIG. 2.7.2)

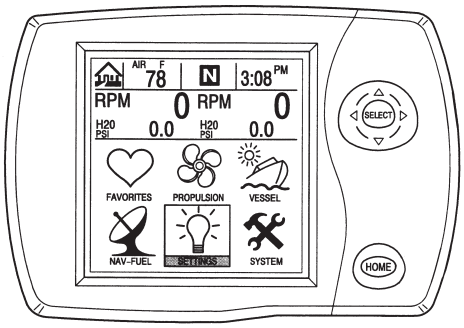


The water temperature gauge indicates temperature of the cooling water circulating inside the engine. Your engine is equipped with a thermostat so a predetermined engine temperature should be reached soon after starting the engine and maintained thereafter while the engine is running. Refer to your Engine Operator's Manual for proper gauge readings. **If the temperature approaches above normal on your gauge, shut down engine at once.**

C. SMARTCRAFT™

Standard on Sea Ray® Sport Yachts is the SmartCraft™ System, typically located on the gauge panel at the helm. The System View Display is a comprehensive boat information center. This system allows the boat operator to monitor a wealth of critical operational information which is displayed clearly and instantly at the helm.

SMARTCRAFT SYSTEM
(FIG. 2.7.3)



The system monitors **water temperature and depth, engine trim, boat speed, steering angle, system preventive maintenance reminders, and systems diagnostics.**

In addition the system can be integrated with the boat's GPS, if equipped, to provide up to the minute course, speed, and fuel-to-destination information.

SYSTEM CALIBRATION (FOR FIRST TIME USE)

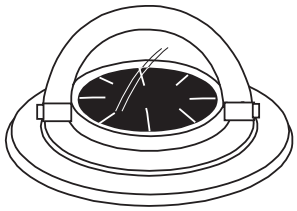
When using SmartCraft™ System View for the first time the system must be calibrated before normal use.

NOTE: The detailed information listed which is standard on some models may be optional on others, or may not be available on some models based on engine and system configuration.

REFER TO THE SMARTCRAFT™ SYSTEM VIEW OWNER'S MANUAL IN THE OWNER'S PACKAGE FOR ALL SMARTCRAFT™ OPERATING INSTRUCTIONS.

D. MAGNETIC COMPASS

MAGNETIC COMPASS
(FIG. 2.8.1)



Your compass, properly corrected, will indicate magnetic north (not true north). A compass must be adjusted by a qualified person. The reason for this is that nearby instruments or objects containing magnets or current-carrying electrical wires will influence the compass reading. This is especially true if you add electronic devices to the helm station.

After your compass has been professionally adjusted. You will be given a deviation card or chart indicating the correction to be applied when laying out a compass course or making navigational calculations. **Keep this correction card or chart at the helm.**

NOTE: The compass adjustment is only good for the equipment arrangement that existed at the time of the adjustment. If you place different equipment or remove equipment from the vicinity of the compass, you cannot rely on the compass reading. The compass must be readjusted by a qualified person after equipment is added or removed from the vicinity of the compass.

NOTE: The compass roses shown on navigational charts have both true north and magnetic north directions superimposed. Make certain you plot course compass directions from the magnetic north compass rose.

When not in use, the compass should be protected from excessive and prolonged sunlight. If your compass becomes sluggish or erratic, it should be serviced by an authorized repair station.

To keep the plexiglass dome free from scratches, remove salt deposits and dust with a damp cloth. An occasional treatment with paste wax will help preserve the dome surface.

REFER TO OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

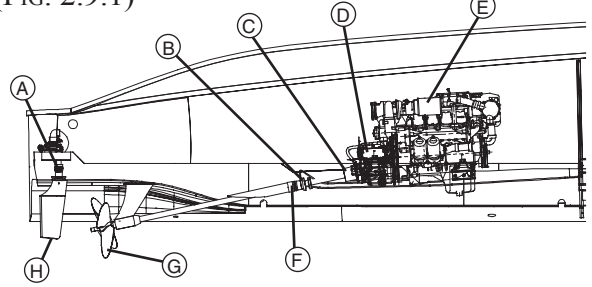
5. PROPULSION SYSTEM

INBOARD SYSTEM

The propulsion systems on Sea Ray® Sport Yachts are inboard engines with either a conventional prop shaft in either a straight or v-drive transmission system or a Zeus pod propulsion system (available only with Cummins MerCruiser diesel engines). See Section 4 • Bilge and Underwater Gear for more information on the engines.

REFER TO THE ENGINE OWNER'S MANUAL FOR OPERATING INSTRUCTIONS AND WARRANTY INFORMATION.

INBOARD
(FIG. 2.9.1)

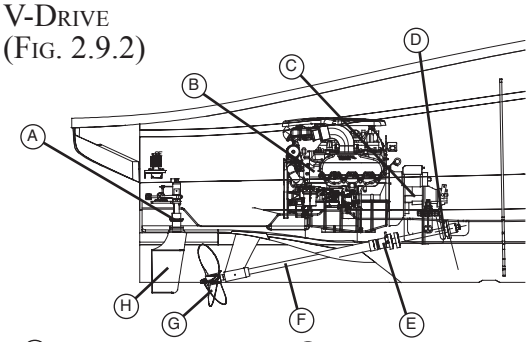


Ⓐ RUDDER STUFFING BOX
Ⓑ SPARE SHAFT SEAL
Ⓒ SHAFT COUPLING
Ⓓ TRANSMISSION
Ⓔ ENGINE
Ⓕ SHAFT LOG & STRONG SEAL
Ⓖ PROPELLER
Ⓗ RUDDER

V-DRIVE SYSTEM

The V-drive system incorporates inboard engines with an angled transmission that allows the drive shaft to pass through the hull under the engine.

V-DRIVE
(FIG. 2.9.2)

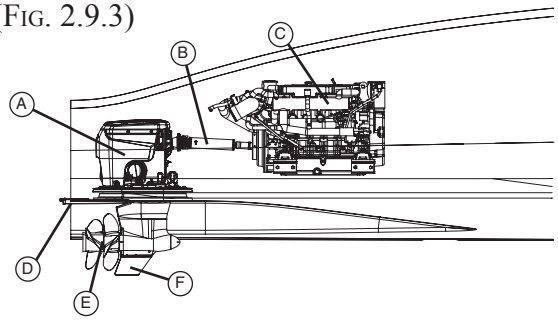


Ⓐ RUDDER STUFFING BOX
Ⓑ ENGINE
Ⓒ TRANSMISSION
Ⓓ SHAFT COUPLING
Ⓔ SHAFT LOG & STRONG SEAL
Ⓕ SHAFT
Ⓖ PROPELLER
Ⓗ RUDDER

ZEUS POD SYSTEM

The Zeus Pod propulsion system incorporates a pod drive with counter-rotating stainless steel, rear facing propellers and a through hub exhaust. Independent vectoring for each drive delivers improved high-speed handling. These steerable pod drives, along with an advanced joystick control system deliver precise turning and maneuvering in tight areas such as docking. The Zeus drives also come equipped with automatic trim tabs that operate via computer control to provide basic performance control and efficiency improvements.

ZEUS POD DRIVE SYSTEM
(FIG. 2.9.3)



Ⓐ DRIVE UNIT
Ⓑ DRIVE SHAFT
Ⓒ ENGINE
Ⓓ TRIM TAB
Ⓔ COUNTER-ROTATING PROPS
Ⓕ SKEG

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1. PREPARING TO DEPART

As the owner/operator of a Sea Ray® yacht, you are responsible for the safe operation of your boat and the safety of your passengers. Always be sure that required documents, navigational equipment and Coast Guard required safety equipment is aboard and in proper working order.

GENERAL

1. **Weather forecast** - Safe conditions existing for length of trip.
2. **Passengers/Crew** - Instructed in duties for getting underway and fitted for a correct size PFD. One (1) PFD for every person aboard.
3. **Tool Box** - Stocked with a variety of appropriate tools.
4. **Lines, Fenders and Anchor** - Ready for use.
5. **Float Plan** - Shared with friend or relative not on trip.
6. **Navigation Charts** - Available for trip.

BOAT SYSTEMS

1. **Equipment** - Make sure all equipment is stored properly.
2. **Radio and Navigation Equipment** - Check for proper working condition.
3. **Bilge/Engine Compartment** - "Sniff" the bilge/engine compartment for fuel odor. Run the bilge blowers for at least four (4) minutes. Confirm air flow through hull vents.
4. **Bilge Pumps** - Assure that all bilge pumps function properly.
5. **Shore Power Cable** - Disconnected from dockside power inlet.
6. **Trim Tabs** - Full range of motion. No excessive play or binding.
7. **Fresh Water Tank** - Filled and sanitized.
8. **Head System Holding Tank** - Empty
9. **Seacocks** - Open (handle parallel to hose). With the exception of wastewater discharge.

ENGINE

1. **Fuel -** Be sure that you have sufficient recommended fuel for the trip.
2. **Fuel System** - Check for leaks.
3. **Racor Fuel Filters** - Check that filters are clean, tight and free of water.
4. **Fluid levels** - Check engine oil and steering fluid levels.
5. **Coolant Drain Plugs** - Secured
6. **Batteries** - Fully charged (Check water cell levels).
7. **Battery Switches** - Check for proper working condition.
8. **Fuel valves** - Open
9. **Engine Alarm** - Test. Should sound after a few seconds.
10. **Gear Shift and Throttle Controls** - Full range of motion. In NEUTRAL and IDLE positions.

2. WHILE UNDERWAY

GENERAL

1. **Passengers/Crew** - Safely seated with PFD's on or immediately accessible. Keep passengers safe.
2. **Lines, Fenders and Anchor** - Safely stowed.
3. **Operation** - Gradual acceleration/deceleration and turning.
4. **Surroundings** - Be aware of other boats, swimmers, floating debris, etc. at all times.
5. **Carbon Monoxide (CO)** - Operate so as to prevent buildup.
6. **Weather** - Monitor frequently.
7. **Navigation** - Adhere to navigational aids in the water and on shore.

8. **Fuel** - Check consumption regularly.

BOAT SYSTEMS

1. **Trim Tabs** - Bring boat to “On Plane”.
2. **Navigation Lights** - On at night or in reduced visibility.

ENGINE

1. **Tachometers** - Engines operating in safe RPM range (refer to the Engine Owner’s Manual for your specific engine).
2. **Engine Gauges** - Monitor continually.
3. **Engine Operation** - Check idle and shift. Listen for abnormal noises and visually check the engine compartment while underway.

3. RETURNING TO PORT

GENERAL

1. **Passengers/Crew** - Instructed in duties for line handling.
2. **Lines, Fenders and Anchor** - Ready for use.

BOAT SYSTEMS

1. **Anchor Light -** ON if necessary.
2. **Bilge/Engine Compartment -** “Sniff” the bilge/engine compartment for fuel odor. Run the bilge blowers if necessary. Check for water in the bilge. Run bilge pumps if necessary.

ENGINES

1. **Gearshift & Throttle Controls -** Bring to NEUTRAL and IDLE positions.
2. **Tachometers -** Idle the engines for five (5) minutes to cool down.
3. **Ignition -** Depress engine STOP switches on the helm switch panel when engines are cooled down.
4. **Engine Operation -** Check idle and shift. Listen for abnormal noises.

4. SECURING THE BOAT

GENERAL

1. **Shore Power Cables -** Connected to dockside power inlet.
2. **Fenders and Lines -** Fenders in place, lines tied securely to dock.
3. **Equipment -** Dry and stored.
4. **Float Plan -** Notify person who had float plan that you have returned.
5. **Canvas -** Properly install canvas covers
6. **Hull -** Inspect for damage

BOAT SYSTEMS

1. **Seacocks -** Closed (handle perpendicular to hose).
2. **Helm Switch Panel -** All switches in the OFF position.
3. **Gearshift/Throttle Controls -** In the NEUTRAL and IDLE position.
4. **Navigation Lights -** Turned OFF.

ENGINES

1. **Ignition -** Switched in the OFF position (lights off) and master ignition keys removed from DC distribution panel.
2. **Battery Switches -** In the OFF position.
3. **Fuel Valves -** Closed (handle perpendicular to hose).

5. FUELING THE BOAT

Do not mistake the waste pump out deck plate or the fresh water fill deck plate for the fuel fill deck plate.

Refer to your engine manual for the proper grade of fuel for gasoline engine(s). The recommended fuel for diesel engines is #2 diesel fuel.

⚠ DANGER

NO SMOKING

GASOLINE VAPORS ARE EXPLOSIVE

NOTICE

GASOLINE RECOMMENDATIONS

Minimum octane rating of 87 AKI.

The use of improper gasoline or additives can damage your fuel system and is considered misuse of the system. Damage caused by improper gasoline or additives WILL NOT be covered under warranty.

⚠ DANGER

Gasoline vapors can explode from static electricity if fueling is not done properly.

Read and understand this section and *Section 5 • Fuel System*

NOTICE

RECOMMENDED FUEL:

#2 Diesel Fuel

General

- Know your fuel capacity and consumption. Record the amount of fuel used since your last fill up, and compute the engine's hourly fuel usage. As a fuel gauge backup check, deduct the average hourly fuel usage from fuel tank capacity.
- Observe the "Rule of Thirds": one-third fuel for trip out, one-third for return and one-third for reserve.
- Allow an additional 15 percent fuel reserve when operating in rough seas.

Before Fueling

- Fuel during daylight hours.
- Fire extinguisher – close at hand.
- Tie boat securely to the dock.
- Shut off engine, bilge blower and all other electrical equipment.
- Shut off gas burning appliances (gas stove, etc.).
- Close all hatches, doors and keep engine compartment closed to prevent gasoline fumes from entering the cabin or cockpit area.
- All passengers must leave the boat, as a precaution.
- There must be no smoking or any flames within 20 feet of the boat, before, during and for at least 5 minutes after fueling is completed.
- Open fuel fill cap and insert hose nozzle into the fuel fill opening. Fuel fill hose nozzle must contact the fuel fill opening BEFORE adding fuel and throughout the fueling process to prevent discharge of static electricity.

Filling the Tanks

- Check the fill plate label to ensure that fuel is placed ONLY in the fuel tank. The fuel fill plates are typically located on the port and starboard mid or aft decks.
- Keep nozzle in contact with fuel fill opening at all times during fueling.
- Avoid Spills - listen as tank fills and stop adding fuel before it spills. Fuel must have room for expansion.
- Fill tanks equally to maintain even weight distribution.

After Filling

- DO NOT wash spilled fuel overboard. Wipe up any spill with rags or paper towels and dispose of them properly on shore.
- Open engine compartment and check for fuel fumes. This is especially important if your boat

is equipped with a gasoline engine. Leave compartment open until no odor is apparent. Close compartment.

- If fumes in the engine compartment do not disappear, do not turn on blower or start engine. Get help from trained and experienced persons before using the boat.
- Turn on blower for four (4) minutes, then restart engine.
- Assist passengers back into the boat.

6. BOARDING

- DO NOT overload the boat and load to less than capacity in adverse conditions.
- Board one person at a time and give assistance as needed.

⚠ WARNING

Wet decks are slippery.

You can be seriously injured if you slip and fall.

Wear slip-resistant footwear secured to your feet and hold onto rails or boat structure.

- Transfer gear and equipment by handing it from a person on the dock to a person on board. You can lose your balance and be injured if you attempt to board while carrying equipment or gear.
- Distribute the weight of equipment and passengers as evenly as possible to keep the boat balanced.
- Stow gear and equipment so that it is accessible, but everything is to be stored in places so as to prevent it from flying about if the boat encounters rough water or weather.

7. PERSONAL FLOTATION DEVICES (PFDS)

- Operator must instruct all passengers on location and use of PFDs (See Section 1• Safety, page 5 for type and usage).
- Children less than sixteen (16) years of age and all non-swimmers, adults as well as children, must wear properly-sized PFDs at all times when aboard.
- ALL passengers should wear PFDs. By the time someone falls overboard, it can be too late for them to put on a PFD and fasten it properly. This is especially true in colder waters, below 70˚F, where survival time, before hypothermia sets in, is measured in minutes.
- If there are passengers not wearing PFDs, the PFDs must be readily accessible. “Readily accessible” means out of the storage bag and unbuckled.
- All throwable flotation devices (cushions, rings, etc.) must be right at hand.

8. PASSENGER INSTRUCTION AND LOCATION

- Everyone on board must be told about the boat’s behavior from starting to getting up on plane.
- Before the operator does any high-speed maneuvers or rapidly accelerates or decelerates the boat, passengers must be warned to sit and hold on and must heed the warning.
- The operator may have to make rapid changes in speed and/or direction to avoid a problem, with little or no time for alerting passengers. It is critical that all passengers be seated in the designated seating areas and holding on to prevent falling overboard or getting knocked about in the boat at all times when the boat is underway.

9. STARTING THE ENGINE

⚠ DANGER

Gasoline vapors can explode

Before starting the engines, open engine compartment and check for gasoline smell.

- **If you smell gasoline, do not start engine; get everyone off the boat and get trained help to find and fix the problem.**

If there is no gasoline smell, perform checks specified by manual, then and only then, close engine compartment and run blower for at least 4 minutes before starting.

The engine operation and maintenance manual furnished with your boat describes pre-start and starting procedures. We urge you to thoroughly read and understand your engine manual.

Listed below are basic pre-start and starting reminders. These are not a substitute for the engine manufacturer's specific recommendations.

Open the engine compartment and check for the smell of fuel.

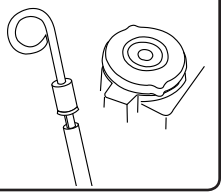
- IF YOU SMELL FUEL, get everyone off the boat, do not operate any electrical switches or light any matches, lighters, etc. Get trained help to find and fix the problem before starting the engine or operating any switches on the boat.

(FIG. 3.5.1)

- If you DO NOT smell fuel...

1. Check all fluid levels and any other necessary checks as specified in Section 8 and in the engine manual.

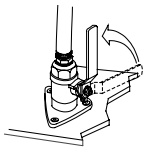
(FIG. 3.5.2)



2. Check that water level in bilge is minimal. Verify that the bilge pump is operating by turning the bilge pump switch to MANUAL and listening for the pump running and check to see that bilge water is being pumped overboard.

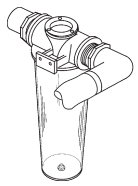
3. Check intake seacocks for open position

(FIG. 3.5.3)



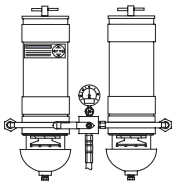
4. Make sure strainers are clean and water tight (see Section 4 – Bilge and Underwater Gear, page 4.12).

(FIG. 3.5.4)



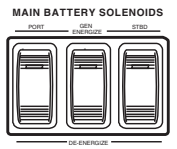
5. Check fuel filters for tightness

(FIG. 3.5.5)



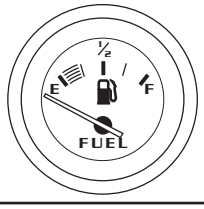
6. Check battery solenoid switches for energized position.

(FIG. 3.5.6)



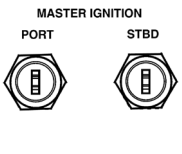
7. Check fuel level. Be sure you have enough fuel for your trip. Remember the "Rule of Thirds": Use no more than 1/3 of your fuel for outbound trip; use 1/3 of the fuel for return trip; keep 1/3 for reserve in case of emergency.

(FIG. 3.5.7)



8. Turn on the master key switches, typically located on the DC distribution panel, (see Specific Information Manual for location for you boat). Listen for alarms which indicate ignition power.

(FIG. 3.5.8)



9. Run bilge blowers for at least four (4) minutes before attempting to start engine.

   Unlike your automobile engine which is naturally ventilated even when it is not moving, your boat engine compartment (the bilge) does not have sufficient natural ventilation when the boat is not moving or moving slowly. That is why the engine compartment must have forced ventilation, using the bilge blower, to remove potentially explosive gasoline vapors, before the engine is started and when the boat is moving slowly.

   Because it may be difficult to remember to turn on the bilge blower every time you slow down the boat, it is recommended that the bilge blower run all the time when the engines are running.

10. Place the throttle/shift lever into neutral.

11. TO START ENGINE:

(FIG. 3.6.1)

   A. For DTS (gasoline) systems, press and release the START button on the dash. The DTS system will properly start the engine.

   B. For ETS (diesel) systems, push on the top of the ignition switches until the engines start. Do not operate starter for more than ten (10) seconds without allowing starter to cool for two (2) minutes. This will also allow the batteries to recover between starting attempts. Once engine has started and sufficient oil pressure is achieved, alarm buzzer will stop.

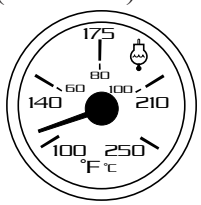
   Important: Check engine RPM on tachometer as soon as engine starts. **Do not allow RPM to exceed 1,500.** Move throttle lever down to decrease RPM.

Note: Alarm will sound when:

- Engine oil pressure is too low.
- Engine temperature is too hot.
- Transmission oil is too low.
- Transmission temperature is too hot.
- Engine stalls.
- Exhaust temperature too high.

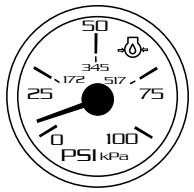
12. Check the oil pressure and look at exhaust port to assure that engine is pumping water.

(FIG. 3.6.2)



13. Check Water Temperature to ensure temperature range remains normal.

(FIG. 3.6.3)



14. Let the engines warm up at idle and check for leaks. If engine is cold, run for a short period of time at fast idle speed that does not exceed 1500 RPM.

14. If oil pressure or water temperature is higher than normal, shut down the engines and recheck fluid levels; top off if necessary.

NOTE: For general operation of the boat, its instruments and the engine, follow detailed instructions on “Engine Break-in” in the Engine Operator’s Manual.

REFER TO OWNER’S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

⚠ WARNING

DO NOT run the engine or generator in an enclosed area, such as a closed boat house, as there is the possibility of buildup and inhalation of carbon monoxide.

10. SHIFTING TO DRIVE THE BOAT

⚠ CAUTION

Cockpit can fill with water if boat is moving forward, when it is put into reverse.

Before shifting into reverse, shift to neutral, wait for the boat to stop moving forward, then shift into reverse.

(FIG. 3.7.1)

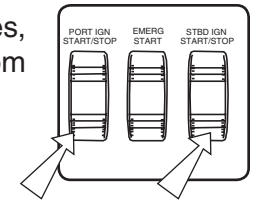
Move shift/throttle lever either forward or reverse, but not very far from the neutral position. The drive unit will engage and boat will start to move slowly in either forward or reverse. You can damage the transmission if you do not shift quickly from neutral into gear. Once clear of the dock, mooring, people and/or the no-wake zone and the boat has been shifted into forward gear, move shift/throttle lever forward to desired engine speed.

11. STOPPING THE ENGINES

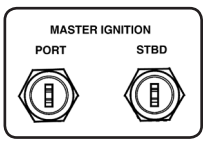
(FIG. 3.7.2)

1. Bring throttle/shift controls to NEUTRAL position.
2. Secure mooring lines.
3. Idle for five (5) minutes to cool the engines.
4. A. For DTS (gasoline) engines, press and release the START button on the dash.

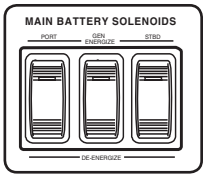
   B. For ETS (diesel) engines, press and release the bottom of the ignition switches.



5. Switch the master ignition key switches OFF.



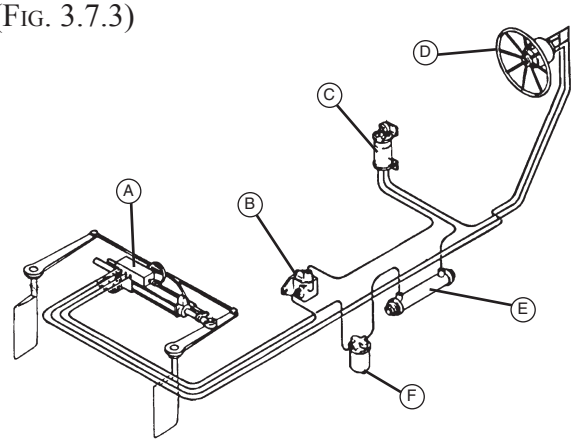
6. Turn battery solenoid switches OFF.



12. STEERING SYSTEM

The hydraulic power steering system uses the boat's engines to provide the "power" for the steering system, via a mechanical or electrical motor driven hydraulic pump.

TYPICAL HYDRAULIC POWER STEERING ASSEMBLY (FIG. 3.7.3)



Ⓐ STEERING CYLINDER
Ⓑ PUMP
Ⓒ OIL RESERVOIR
Ⓓ HELM
Ⓔ OIL COOLER
Ⓕ OIL FILTER

A manual hydraulic steering system, consisting of a helm and a hydraulic cylinder (fitted with an integral servo cylinder and a power steering valve), supplies the "control" portion of the steering system.

Under normal conditions, with engines running, a hydraulic oil supply is in a standby mode, ready to be directed to the steering cylinder as dictated by the steering wheel, servo cylinder and power steering valve. Turning the steering wheel left or right makes the system go from "standby" into "operating" mode and move the steering cylinder accordingly.

In the event of a power source failure, hydraulic oil from the steering helm is automatically diverted into the servo and steering cylinder, providing the helmsman with manual backup steering.

An engine room mounted oil reservoir allows easy fill and assists the in-line cooler in cooling the hydraulic oil. An in-line oil filter helps to protect the steering system components against contaminants.

REFER TO OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

13. STARTING THE GENERATOR

The following instructions cover only Sea Ray Sport Yachts with a conventional hard wired electrical system. For boats with the multiplexed power distribution system, refer to your Specific Information Manual for applicable instructions.

NOTICE

Pre-start generator prior to getting underway as there is a possibility that it will not pick up water if started underway. Make sure the MAIN GENERATOR breaker is OFF and there is no load on the generator before starting it.

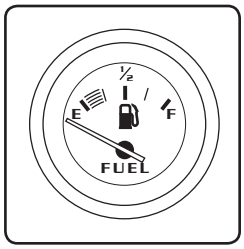
⚠ WARNING

DO NOT run the engine or generator in an enclosed area, such as a closed boat house, as there is the possibility of buildup and inhalation of carbon monoxide.

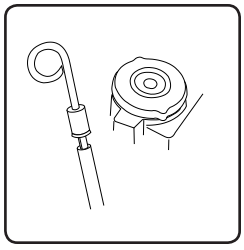
Sea Ray® strongly urges you to fully comply with the manual provided by the generator manufacturer. The generator is warranted separately by the generator manufacturer, NOT Sea Ray®. Follow the recommended maintenance and warranty schedule in your Generator Operator's Manual included in the Owner's Manual Package. Generator abuse or improper maintenance may adversely affect claims made under generator manufacturer separate warranty.

(Remote control switches are located on the main distribution panel or local switches on the generator.)

1. Check fuel tank levels.

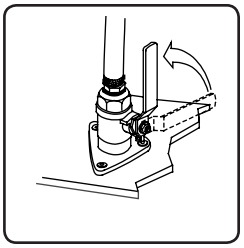


2. Check oil and coolant levels. See Generator Operator's Manual for proper readings.

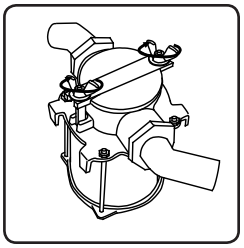


3. Check generator for coolant drain plug installation.

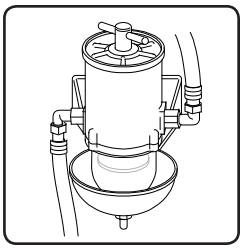
4. Open the generator seacock.



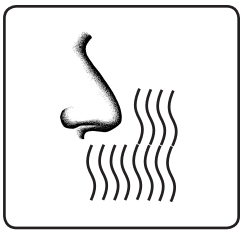
5. Make sure strainers are clean and water tight (see Section 4 – Bilge and Underwater Gear).



6. Check generator fuel filter for tightness

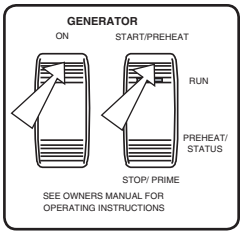


7. Check the bilge for fuel fumes or liquid. **Do not start the generator until the source of fumes is determined and corrected and the bilge area is safely ventilated.**



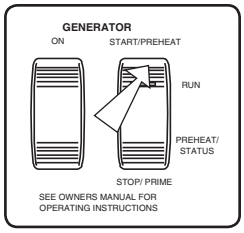
8. Run the bilge blowers for at least four minutes before starting and any time the generator is running. **If fuel fumes are detected, do not start the generator until the source of fumes is determined and corrected and the bilge area is safely ventilated.**

9. (a) Press the "ON" switch. Supplies power to Auto Fire Extinguisher and Systems Monitor on helm to monitor generator.



(b) Depress and hold the "START/PREHEAT" switch. The starter motor will run, thereby cranking the generator engine.

(c) Release the "START/PREHEAT" switch when generator starts.



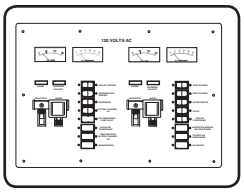
10. Check generator exhaust port to verify that water is flowing. If not, shut generator down and refer to your Generator Operator's Manual.

READ THE OWNER'S MANUAL IN THE OWNER'S MANUAL PACKAGE FOR YOUR GENERATOR MODEL.

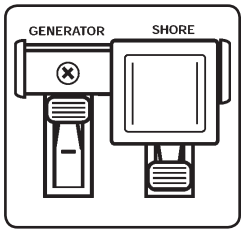
14. Shifting From Shore Power to Generator Power

The following instructions cover only Sea Ray® Sport Yachts with a conventional hard wired electrical system. For boats with the multiplexed power distribution system, refer to your Specific Information Manual for applicable instructions.

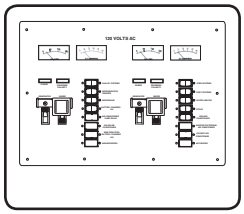
1. Turn all AC systems and branch circuit breakers OFF. Turn both main breakers on the main distribution panel OFF.



2. Start the generator.
3. Slide the source select shuttle mechanism on the main distribution panel to expose the GENERATOR breaker(s) and turn it ON.



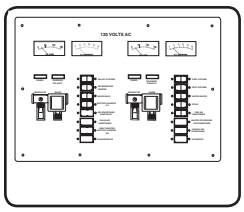
4. Turn the individual system breakers ON.



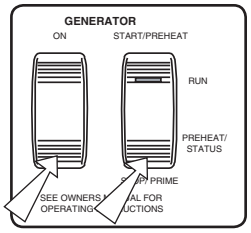
15. Stopping the Generator

The following instructions cover only Sea Ray Sport Yachts with a conventional hard wired electrical system. For boats with the multiplexed power distribution system, refer to your Specific Information Manual for applicable instructions.

1. Prior to generator shut down turn OFF all AC equipment and breakers including main breakers and allow the generator to run a few minutes to cool down. If desired, transfer to shore power.



2. Stop the generator by pressing the bottom of both generator switches or pressing the stop switch on the generator.



REFER TO OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

16. Shore Power

A. Shore Power Cord

Sea Ray Sport Yachts are equipped with either dual 30AMP/ 120V/60 cycle or single 50AMP/ 240V/50 cycle shore power cord(s) for hookup to dockside power. The cord(s) are stored in the transom storage box.

B. Shore Power Breaker

There is/are corresponding shore power breaker box(es) located on the starboard side of the transom storage box above the shore power receptacle(s).

REFER TO THE SPECIFIC INFORMATION MANUAL FOR INFORMATION ON YOUR BOAT.

C. Shore Power Operation

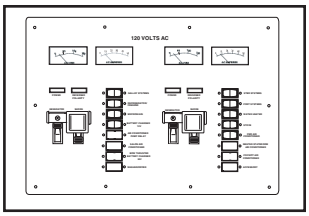
The following instructions cover only Sea Ray® Sport Yachts with a conventional hard wired electrical system. For boats with the multiplexed power distribution system, refer to your Specific Information Manual for applicable instructions.

The Main AC Distribution Panel, typically located in the salon, distributes the required voltage for all the boat's AC equipment and accessories. It is very important to know and understand where the power originates and how the power is distributed to the different voltage equipment and accessories.

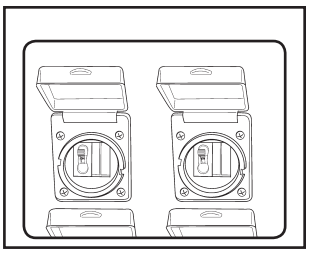
D. To Connect and Turn On Shore Power

The following instructions cover only Sea Ray® Sport Yachts with a conventional hard wired electrical system. For boats with the multiplexed power distribution system, refer to your Specific Information Manual for applicable instructions.

1. **On The Boat:**
   Turn **OFF** all equipment breakers and Turn OFF SHORE & GENERATOR breakers.

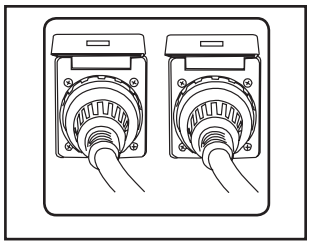


2. Assure that the AC breaker above the shore power plug in the starboard transom compartment is **OFF**.



3. Dry off the shore power cord receptacle on your boat. Dry off the ends of the shore power cord. Spray a moisture repellant into the receptacle and cord ends.

4. Plug a cord end into the boat receptacle. Turn clockwise to lock. Thread the locking ring onto the boat receptacle to prevent accidental unplugging.



⚠ CAUTION

It is imperative that the shore power outlet is dry before plugging into the dock power inlet.

⚠ CAUTION

Route and tie the power cord from the boat to dockside power outlet box to prevent persons tripping over it and falling into the water.

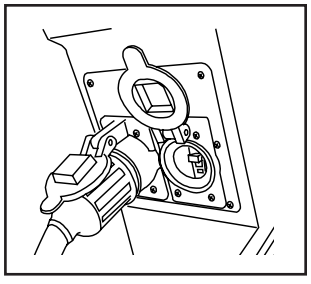
⚠ CAUTION

Shore power cords should be secured or routed to avoid laying or falling into water and to avoid stress on shore power plug and inlet.

⚠ CAUTION

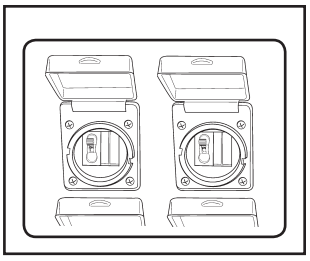
The use of extension shore power cords is not recommended. Excessive power cord extensions can cause a voltage drop and may prevent some electronic devices from operating correctly.

5. **On The Dock:**
   Turn **OFF** Dock Breaker. Wipe the outlet dry, spray moisture repellent into the receptacle, then plug the other end of the power cord into the outlet box on the dock.



6. Turn **ON** Dock Breaker.

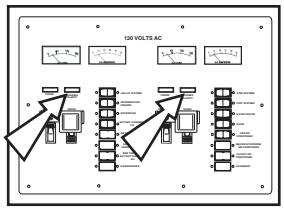
7. **On The Boat:**
   Turn **ON** the AC breaker above the shore power plug in the transom compartment.



8. **On The Boat:**

   Assure that the POWER light is **ON**.

   (If reversed polarity light is on do not turn on breakers, turn **OFF** MAIN and DOCK breakers. Disconnect power cords. Consult dockmaster.)



9. **Turn ON Breakers:**

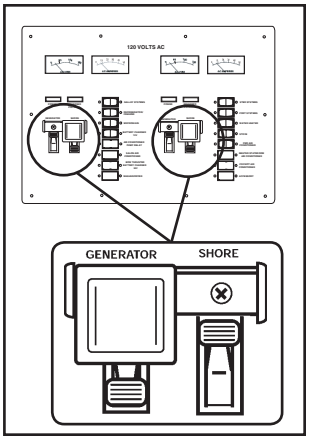
   Turn **ON** SHORE breaker.

   Verify proper voltage.

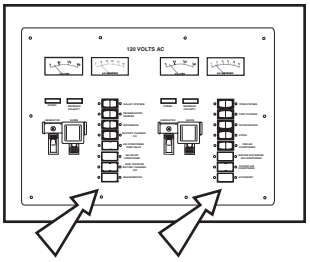
⚠ CAUTION

Do not energize main breaker under reversed polarity conditions.

(120 Volt System: 110V to 125V)
(240 Volt System: 220V to 250V)



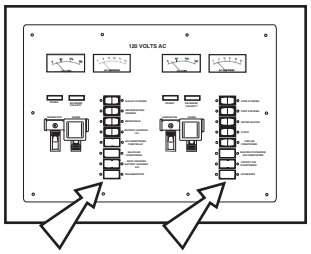
10. Turn **ON** Equipment Breakers.



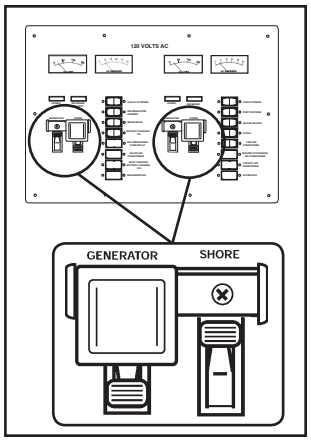
E. To Disconnect Shore Power

1. **On The Boat: Turn OFF All Breakers**

   Turn OFF equipment breakers.



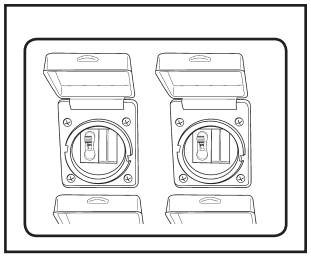
2. Turn **OFF** SHORE breaker.



⚠ WARNING

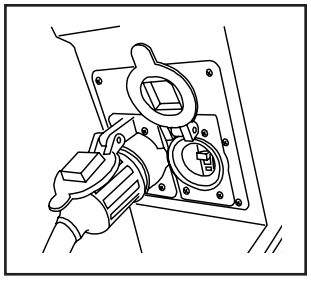
Under no circumstances override the source select system.

3. Turn **OFF** MAIN breaker above the shore power plug in the transom compartment.

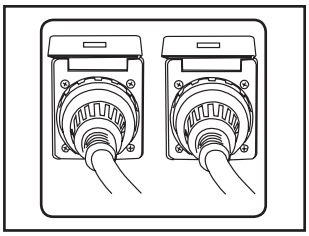


4. **On the dock**, turn **OFF** the dockside breaker.

   Disconnect the dockside end of the power cord.



5. **On your boat**, disconnect the power cord from your boat receptacle.



Clean the power cord, spray the cord ends with moisture repellant, and store the cord in a dry location on board.

You must keep the shore power cord and the plug ends clean and dry. This is especially necessary if your boat is used in salt water. Always clean and spray your cord ends with moisture repellant before using and before storing the cord.

F. Maintenance for Shore Power Cable Set & Shore Power Inlets

The metallic parts of your cable set and inlet are made to resist corrosion. In salt water environment, life of the product can be increased by periodically wiping the exposed parts with fresh water, drying and spraying with a moisture repellent.

A soiled cable can be cleaned with grease-cutting household detergent. A periodic application of vinyl protector will help both ends and cable maintain their original appearance.

In case of salt water spray or immersion: Rinse plug end and/or connector end thoroughly in fresh water, shake or blow out excess water and allow to dry. Spray with a moisture repellent before reuse.

⚠ WARNING

Disconnect the power cable from power source before performing maintenance.

17. Anchoring

To anchor, bring the bow into the wind or current and put the engine in neutral. When the vessel comes to a stop, lower the anchor from the bow. The anchor line should be 5 to 7 times the depth of the water.

A. Anchoring Arrangement

Sea Ray Sport Yachts are equipped with a windlass and an anchor chute. Stow the anchor in the chute when not in use.

NOTE: Before using the anchor, be sure the anchor safety hook is removed from the anchor and the anchor is secured to the windlass chain.

⚠ WARNING

SINKING HAZARD – Anchor from the bow if using one anchor. A small current can make a stern-anchored boat unsteady; a heavy current can drag a stern-anchored craft under water.

COLLISION HAZARD – Anchor only in areas where your boat will not disrupt other boats. Do not anchor in a channel or tie up to any navigational aid. It is dangerous and illegal.

B. Anchoring

Proper anchoring requires knowledge of RODE and SCOPE. Read this section carefully, understanding the relationship between rode, scope and anchor performance.

The **rode** is the line connecting the anchor to the boat. It may be either a rope/chain anchor rode or an all chain anchor rode. An all-chain anchor rode is optional.

The **scope** is technically defined as the ratio of the rode length to the vertical distance from the bow to the sea floor. Since you want to know how much rode to use when anchoring, the formula is:

Rode Length = (Bow Height + Water Depth) x Scope

$$\text{Scope} = \frac{\text{Rode Length}}{\text{Bow Height + Water Depth}}$$

- Scope depends on the type of anchor, bottom, tide, wind and sea conditions.
- Minimum is 5:1 for calm conditions; norm is 7:1; severe conditions may require 10:1.

Example:

Rode Length = (3 feet + 10 feet) x 7*

Rode Length = 13 feet x 7*

Rode Length = 91 feet

* Scope factor may range from 5 to 10 or more. Less than 5, the anchor breaks out too easily.

NOTICE

Use the safety hook supplied to ensure that the anchor is held in place should the windlass fail. Do not use the safety hook to support the anchor in a stored position. The windlass should always support the anchor and ensure that it is held in the roller device securely.

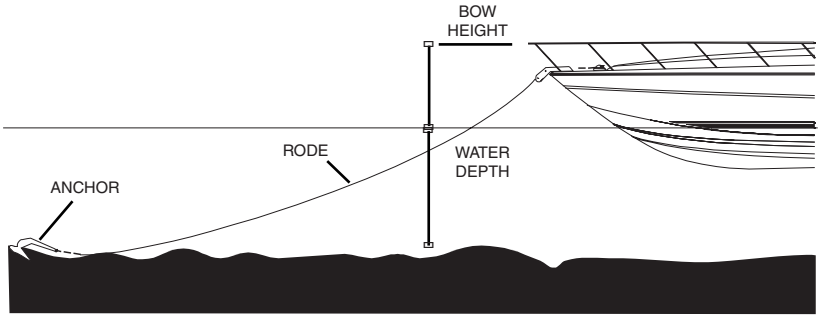
C. Lowering Anchor

- Be sure there is adequate rode.
- Secure rode to both the anchor and the boat.
- Stop completely before lowering anchor.
- If using windlass, refer to windlass operator's manual.
- Keep feet clear of coiled line.
- Turn on anchor light at night and in reduced visibility.

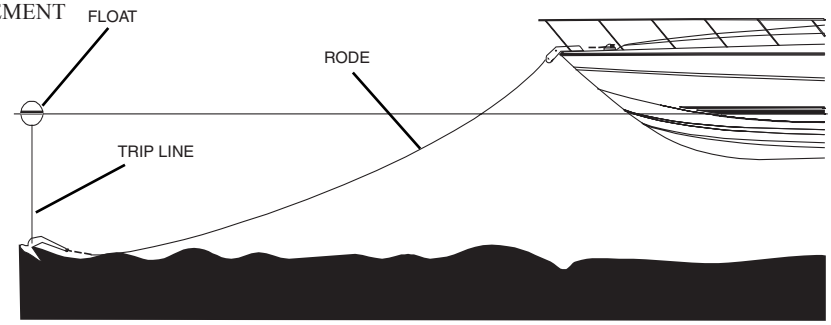
D. Setting Anchor

- There is no best way to set an anchor. Experiment to see how your anchor performs.

Anchoring
(Fig. 3.13.1)



Trip Line Arrangement
(Fig. 3.13.2)



- One method is to turn the rode around a bit and slowly pay out as the boat backs from the anchor site. When the proper scope has been reached, snub the rode quickly, causing the anchor to dig into the bottom.
- Reverse engine slowly to drive the anchor in and prevent it from dragging.

E. Weighing Anchor

- Run the boat slowly up to the anchor, taking in the rode as you go.
- The anchor will usually break out when the rode becomes vertical.
- Be careful that trailing lines do not foul in the propeller.

NOTE: Use the fresh water washdown spigot in the starboard bow locker to hose down the chain in the locker after haul-in.

F. Clearing a Fouled Anchor

A fouled anchor can test your patience and ingenuity. One of the best methods of breaking free is to set a **trip line** (Fig. 3.14.2) before you lower the anchor.

- Attach a line to the crown or head of the anchor and the other end to a float.
- The line should be just long enough to reach the surface of the water, allowing for tides.
- A polypropylene line is a good choice because it is light, strong and floats.
- If the anchor snags, pull vertically on the trip line to lift the anchor by the crown.

G. A Final Word

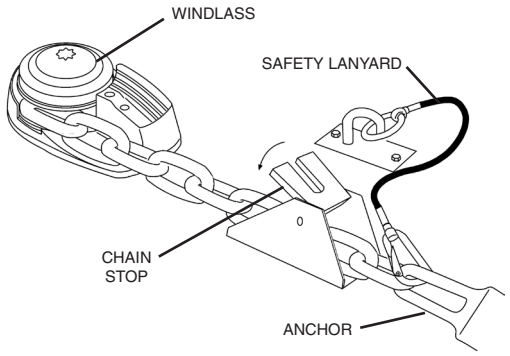
An anchored boat is affected by wind and sea conditions. Because there is no headway, there is no control. Be alert! If leaving the boat, be sure the anchor will hold under all circumstances.

We suggest you read this section on anchoring again and fully understand rode and scope and their affect on anchor performance.

18. Windlass

The windlass facilitates the anchoring of your yacht by automatically raising and lowering the anchor. To operate the windlass the WINDLASS MAIN switch on the control station switch panel must be ON.

Windlass w/ Safety Lanyard and Chain Stop (Fig. 3.14.1)



NOTICE

It is important that the windlass clutch is tight for proper operation and safety. Periodically check the clutch and tighten if necessary.

To Tighten Clutch:

With the anchor in the stowed position, tighten the windlass clutch by inserting the emergency handle into the clutch nut (See Fig. 3.16.1) and turn clockwise.

⚠ WARNING

Keep hands, feet, hair and loose clothing clear of moving parts. Entanglement may cause severe bodily injury (i.e. loss of fingers or toes).

A. To Operate From the Helm:

- Make sure that the safety lanyard (Fig. 3.15.1) is removed from the anchor chain.
- Turn the WINDLASS MAIN rocker switch ON.
- Push the toggle switch (located beside the rocker switch on the control station switch panel) UP to raise the anchor. To lower the anchor, push the toggle switch DOWN.

B. To Operate From the Bow:

- Make sure that the safety lanyard (See Fig. 3.15.1) is removed from the anchor chain.
- Lift protective cap on foot switches and depress UP or DOWN switch for the desired result.

C. To Operate Manually:

- Make sure that the safety lanyard (See Fig. 3.15.1) is removed from the anchor chain.
- Insert the emergency handle into the clutch nut (See Fig. 3.16.1)
- Turn handle clockwise to retrieve anchor.

D. Maintenance:

- Periodically check the motor and control box electrical connections, remove any residue and cover the connections with a small coating of grease.

It is recommended at least once a year to disassemble the windlass and remove any residue build-up.

⚠ DANGER

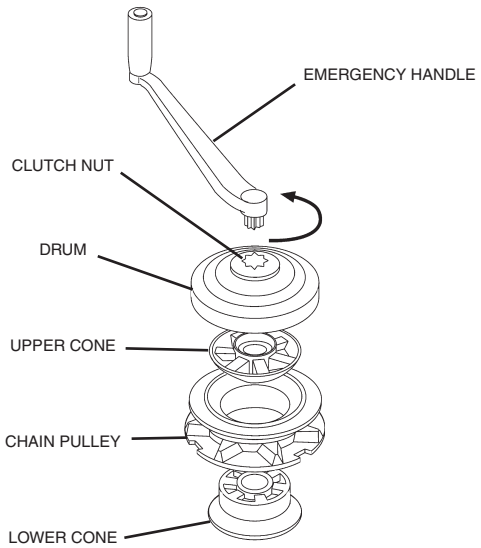
Make sure that the power is off before any work is performed on the windlass.

- Using the emergency handle, unscrew the clutch nut by turning the handle counterclockwise.
- Remove the drum, upper cone, chain wheel and lower cone.
- Wash down with fresh water and remove any residue.
- Coat contact surfaces with a light film of lubricant.
- Reassemble the unit and tighten clutch nut by turning the handle clockwise.

NOTE: Use the fresh water washdown spigot in the starboard bow locker to hose down the chain in the locker after haul-in.

REFER TO WINDLASS OPERATOR'S MANUAL IN YOUR OWNER'S PACKAGE FOR DETAILED OPERATING INSTRUCTIONS.

Windlass (Maintenance Profile)
(Fig. 3.15.1)



1. BILGE

A. FUEL AND OIL SPILLAGE

Regulations prohibit discharging fuel or oily waste in navigable waters. Discharge is defined as any action which causes a film, sheen or discoloration on the water surface, or causes a sludge or emulsion beneath the water surface. A common violation is bilge discharge. Use rags or sponges to soak up fuel or oily waste, then dispose of them properly ashore. If there is much fuel or oil in the bilge, contact a knowledgeable marine service to remove it. Never pump contaminated bilge water overboard.

Fill fuel tank to less than rated capacity. Allow for fuel expansion.

B. DRAIN PLUG

⚠ DANGER

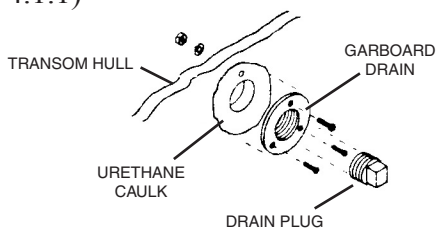
Install and tighten drain plug before launching boat.

Boat will sink if drain plug is not in place and tight.

The bottom of the engine compartment is called the “bilge”. It is the lowest and inner part of the hull. Water and other liquids will collect there.

After removing your boat from the water, remove the drain plug to drain the bilge.

DRAIN PLUG
(FIG. 4.1.1)



C. BILGE PUMP(S)

At least one bilge pump and float switch are located in the bottom of the bilge. The bilge pump can be manually activated from the switch located on the Switch Panel at the helm. Before starting the engine, push up on the bilge pump switch so that the switch light comes ON. Make sure the pump is working by opening the engine compartment, listening to hear the pump running and checking to see that liquid is being pumped out from the bilge pump through hull discharge.

⚠ WARNING

SINKING HAZARD- Ensure the bilge pumps are operating properly.

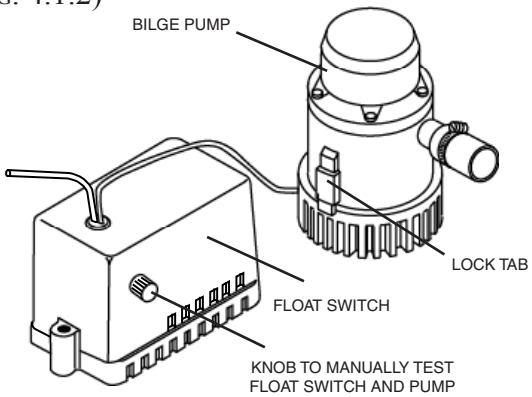
⚠ WARNING

Do not allow obstructions to interfere with the Bilge Blower or Ventilation Intake operation. Engine(s) performance may be adversely affected.

⚠ CAUTION

Run bilge pumps in the manual position only as long as necessary to remove water. Running bilge pumps dry can damage the pump motor.

TYPICAL BILGE PUMP AND FLOAT SWITCH
(FIG. 4.1.2)



See your Specific Information Manual for location and quantity of the Bilge Pump(s) and Switch(es).

Except for checking the operation of the bilge pump by using the ON position, leave the switch in the OFF (AUTO) position. In the OFF (AUTO) position, when the bilge liquid is deep enough to activate the float switch, the bilge pump turns on and pumps out the bilge liquid until the float switch drops and shuts off the pump.

If the liquid level in the bilge is higher than normal and the bilge pump empties the bilge when you use the ON switch, either the breaker for the automatic bilge pump circuit has blown or the float switch is not operating properly. Have it checked immediately. If the ON switch does not operate the pump, DO NOT use the boat until the problem has been corrected.

Both the automatic and manual bilge pump circuits are protected by a breaker on the main DC breaker panel.

1. Maintenance

Frequently inspect the area under the float switch to ensure it is free from debris and gummy bilge oil. To clean, soak in heavy duty bilge cleaner for 10 minutes, agitating several times. Check for unrestricted operation of the float. Repeat the cleaning procedure if necessary.

Inspect the bilge pump intake and keep it free of dirt or material which may impede the flow of water through the pump. To clean the pump strainer, depress the lock tabs on both sides of the pump and lift the pump motor.

2. Troubleshooting:

If water does not come out of discharge hose:

1. Check the "BILGE PUMP" breaker on main DC Breaker Panel (see Specific Information Manual) to ensure it has not been tripped.
2. Remove the motor module to see if the impeller rotates with the power on.
3. Remove any debris that may have accumulated in the nozzle section or strainer base.
4. Check hose and connection on hull side for debris and proper connections.

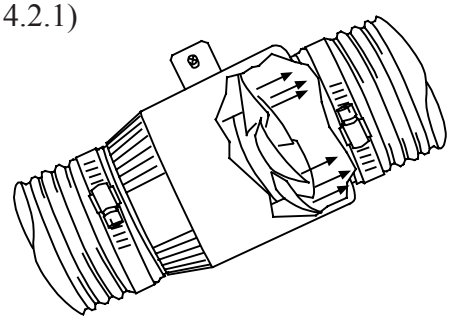
D. Bilge Blower

To prevent buildup of gasoline fumes to the explosive level in the engine compartment, the bilge blower must be run for at least four (4) minutes before starting the engine and kept running at all times when the engine is running to ensure that there will be adequate ventilation when you are moving slowly.

⚠ WARNING

Do not allow obstructions to interfere with bilge blower or ventilation intake operation. Engine performance may be adversely affected.

Bilge Blower
(Fig. 4.2.1)



The bilge blower is protected by a breaker on the main DC breaker panel.

⚠ WARNING

EXPLOSION/FIRE HAZARD – Run blower at least four (4) minutes before starting engine or generator. Check bilge and engine compartment for fumes.

2. Engines

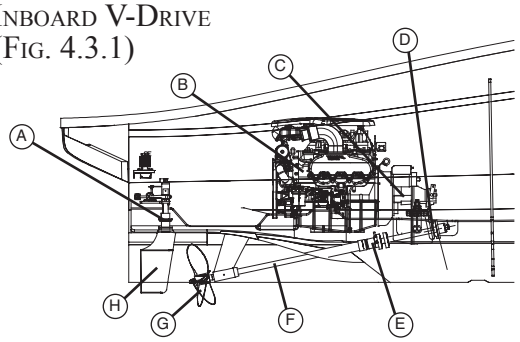
The engines are the heart of your Sea Ray Sport Yacht. Proper attention to and maintenance of your engines will assure you of many hours of pleasurable, safe boating and will prevent unnecessary engine problems. You must, therefore, become thoroughly familiar with all aspects of the engine's proper operation outlined in the Engine Operator's Manual. A general maintenance program consists of proper

lubrication, cleaning of fuel filters, fuel lines and air filters. **When washing down, or at any other time, take care that water does not enter the air inlets.** Water entering the air inlets when the engines are not operating may go directly into the cylinders, resulting in rust and possibly internal engine damage.

The engines and their components are warranted directly by the engine manufacturer, not by Sea Ray®.

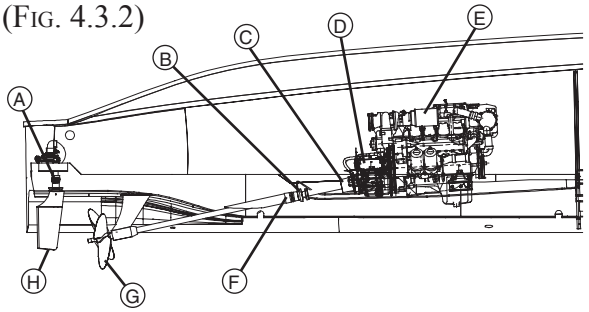
Sea Ray® strongly urges you to fully comply with the manual provided by the engine manufacturer. Follow the recommended maintenance and warranty schedule in your Engine Operator's Manual included in the owner's package. Engine abuse or improper maintenance may adversely affect the claims made under the independent warranty provided by the engine manufacturer.

INBOARD V-DRIVE
(FIG. 4.3.1)



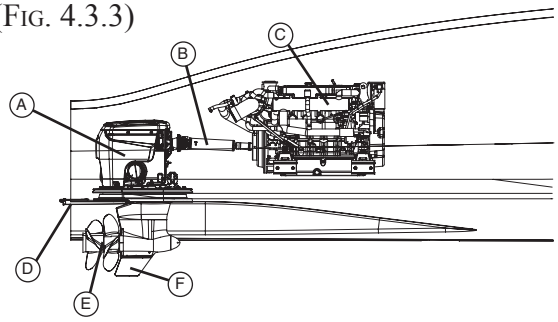
Ⓐ RUDDER STUFFING BOX
Ⓑ ENGINE
Ⓒ TRANSMISSION
Ⓓ SHAFT COUPLING
Ⓔ SHAFT LOG & STRONG SEAL
Ⓕ SHAFT
Ⓖ PROPELLER
Ⓗ RUDDER

INBOARD
(FIG. 4.3.2)



Ⓐ RUDDER STUFFING BOX
Ⓑ SPARE SHAFT SEAL
Ⓒ SHAFT COUPLING
Ⓓ TRANSMISSION
Ⓔ ENGINE
Ⓕ SHAFT LOG & STRONG SEAL
Ⓖ PROPELLER
Ⓗ RUDDER

ZEUS POD DRIVE SYSTEM
(FIG. 4.3.3)



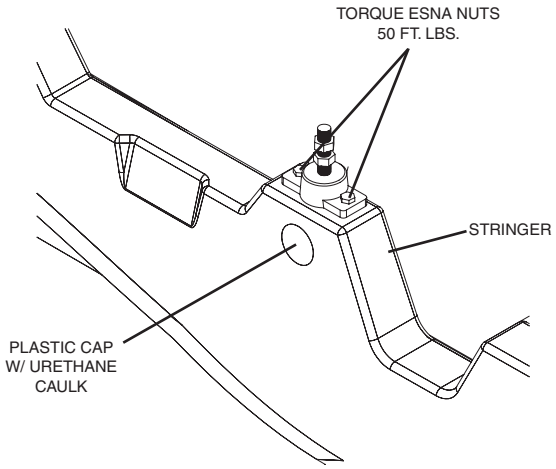
Ⓐ DRIVE UNIT
Ⓑ DRIVE SHAFT
Ⓒ ENGINE
Ⓓ TRIM TAB
Ⓔ COUNTER-ROTATING PROPS
Ⓕ SKEG

3. ENGINE MOUNTS

The adjustable type engine mounts permit adjustment sideways as well as vertically. Vertical adjustment nuts lock up or down on the threaded vertical stud, with a slot provided to allow side to side adjustment on the engine.

IMPORTANT: The large adjustment locknuts on these mounts must be tightened properly to retain alignment. It is also advisable to spray a protective coating on the studs and nuts to prevent corrosion.

ENGINE MOUNT
(FIG. 4.3.4)



4. MARINE GEARS

A. REDUCTION GEARS

A reduction gear reduces the rotating speed of the propeller shaft in relation to the engine RPM. This permits the use of a larger propeller while allowing the engine to attain its rated RPM, thereby increasing efficiency.

B. REVERSE GEARS

The reverse gear incorporates the clutch and controls the rotation of the propeller. The position of the clutch control or shifting lever indicates the motion which the clutch and reverse gear are transmitting. The center position of the lever indicates neutral. **Engine RPM should never exceed 1000 when engaging or disengaging the clutch. Higher RPM will result in unnecessary wear and shortened life of the unit, and perhaps breakage.**

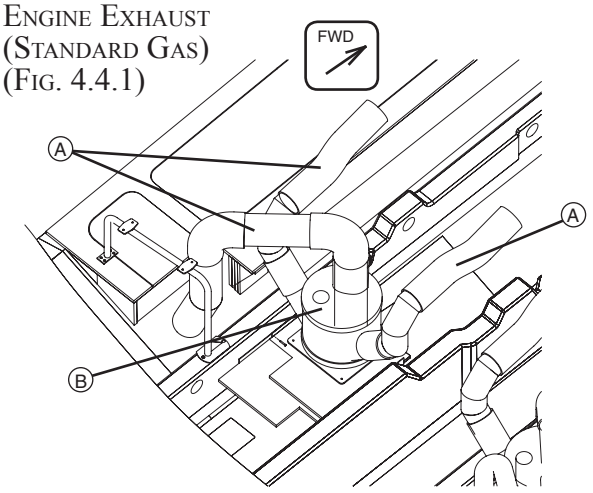
Marine reverse gears are hydraulically operated, thereby making it imperative to periodically maintain and check oil level. If the correct oil level is not maintained, slippage occurs, causing damage to the clutch plates. Too much oil will cause foaming and erratic clutch operation. For additional information see the Engine Operator's Manual.

5. ENGINE EXHAUST SYSTEM (GAS)

The exhaust system on Sea Ray® boats with inboard engines is designed so that water from the raw water cooling system enters the exhaust system through elbows (engine side) where water and exhaust are mixed. Water and exhaust are then pumped through the mufflers and then overboard through the exhaust outlet. Make sure water is flowing from the exhaust outlets while the engines are operating. Prior to every boat use, examine the exhaust system fittings to ensure tightness.

A drain plug is located on each bypass muffler. When servicing or winterizing, remove the plug to drain the water out of each muffler. Replace the plug after all water has drained from the muffler.

ENGINE EXHAUST (STANDARD GAS) (FIG. 4.4.1)

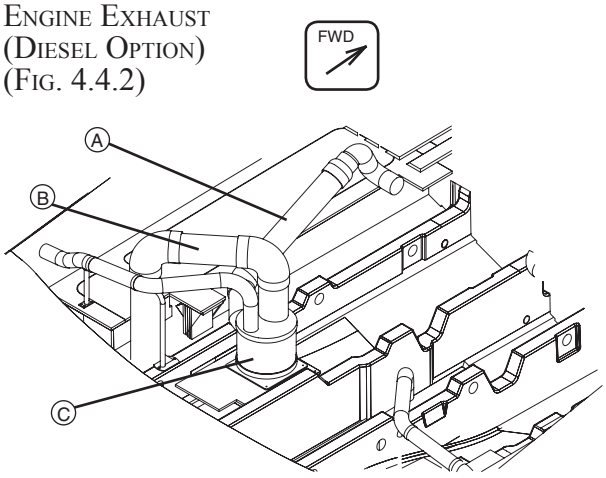


Ⓐ PORT ENGINE EXHAUST
Ⓑ MUFFLER

TYPICAL ENGINE EXHAUST SHOWN

6. ENGINE EXHAUST SYSTEM (DIESEL OPTION)

ENGINE EXHAUST (DIESEL OPTION) (FIG. 4.4.2)



Ⓐ PORT ENGINE EXHAUST
Ⓑ EXHAUST BYPASS
Ⓒ MUFFLER

TYPICAL ENGINE EXHAUST SHOWN

7. Engine Removal

Should the removal of an engine become necessary, **see your Sea Ray® dealer or an authorized service representative of the engine manufacturer.** The following is only a generalized procedure to follow.

⚠ WARNING

Hose clamps must be tight at all times to avoid exhaust leaks.

Shut off the fuel lines and close the engine seacocks. Remove all electrical wires, fuel lines and raw water intake hoses from the engine. Unbolt the engine coupling from the shaft coupling and slide the shaft and coupling back from the engine. Detach both throttle and shift connections. Cap off hoses to avoid hydraulic fluid loss. **Do not bend or twist the hoses, as damage may result.** Remove the mounting bolts for the engine and lift the engine out, leaving the mounts bolted to the stringer caps.

To reinstall, reverse the above procedure. Check the coupling and shaft alignments, as well as water hoses and wiring connections. Also check for fuel and exhaust leaks and make sure seacocks are open before starting engines.

8. Vibration and Causes

Some vibration is to be expected in your boat because of the action of the engines and the propeller. But excessive vibration indicates conditions which must be promptly corrected to avoid damage. The following are some conditions which may cause vibrations.

A. Foreign Object Interfering With Propeller Action

Weeds, ropes, fishing lines, nets or your own trailing lines can become wrapped around the propeller and/or shaft, causing vibration and loss of speed. Always stop the boat, make sure it is clear to the rear, and then reverse the propeller after going through a weedy area to unwrap and clear away any weeds which may have accumulated. Although reversing will sometimes help to unwrap lines and nets, they are difficult to remove without hauling the boat.

Always check for loose or trailing dock lines before getting underway. When towing a dinghy, remember that a long line may easily become entangled with the propeller when backing down.

B. Bent Propeller and/or Shaft

A badly damaged or distorted propeller or shaft is an obvious cause of vibration. Even when the propeller appears to be perfect, make sure it has not been pulled off-center by the propeller key.

C. Engine and Shaft Out of Alignment

Although the shaft is properly aligned when it leaves the factory, after transit and after the boat has been in the water a few days, the alignment should be rechecked. The shaft coupling is the connecting point between the shaft and the engine and the alignment should be set at .005 or less. Refer to SHAFTS (pg. 4.9) in this section of this Owner's Manual.

D. Coupling Out of True

Although an extremely unlikely condition, check the couplings if other efforts to correct the vibration fail. Check the engine half of the coupling (with dial indicator on the face) to see that it runs true with the shaft coupling. Also check the coupling keys. They must fit correctly to prevent forcing the couplings off center.

E. Engine Part Hitting Boat Structure

Engines are flexibly mounted to reduce transmission of vibration to the hull structure. If some part of the engine, such as the oil pan, reverse gear or reduction gear housing, contacts a stringer, brace or part of the hull, vibration will result. The flexible shaft log allows a limited side motion of the shaft, but an excessive "whip" can cause the shaft to strike the sides of the shaft hole or the shaft log with resultant vibration.

F. Other Possible Causes

Other causes of vibration include the following: engine out of tune, a bent rudder, a worn strut bearing, a component of the exhaust system vibrating against the hull or improper contact between shaft taper and the propeller hub bore.

9. Fresh Water Cooling System

The fresh water cooling system is a closed system which helps protect engines from internal corrosion and provides more even distribution of engine temperature. **Change the coolant annually.**

Coolant Recommendations:

The standard mixture of water and coolant is a mixture of 30% environmentally safe, non-toxic antifreeze and 70% water, which protects to 0°F (-18°C). This will allow the coolant to expand properly and maintain normal operating engine temperature. In colder climates, the coolant level should be increased to 50/50, which protects to -34°F (-37°C), for proper coverage. **To find engine coolant requirements for the specific engine on your yacht, refer to your Engine Owner's Manual in the Owner's Manual Package.**

10. Underwater Gear

A. Propellers

Propellers should be free of nicks, excessive pitting and any distortions that alter them from their original design. Badly damaged propellers should be replaced, but those that are chipped, bent or merely knocked out of shape can be reconditioned by your marine dealer.

When doing extensive cruising, it is advisable to carry extra propellers aboard. Extra propellers can be stored on the optional propeller mounts in the engine room.

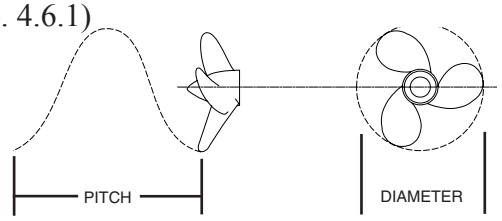
Basic Propeller Characteristics

Propellers have two basic characteristics:

- Diameter
- Pitch

Diameter is that distance measured across the propeller hub line from the outer edge of the 360° that is made by the propeller's blade during a single rotation. Pitch is that distance in inches that a propeller will travel if rotated one revolution without any slippage.

Propeller Pitch and Diameter
(Fig. 4.6.1)

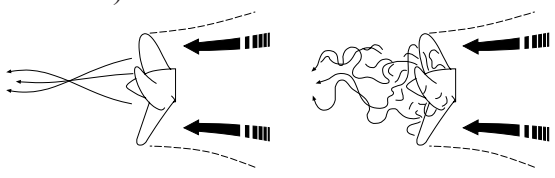


For example, a propeller with a 12-inch pitch, when rotated 360° would, theoretically, advance 12 inches through the water. Actually, no propeller applied to any boat is 100% efficient. No 12-inch pitch blade will, in a single rotation, advance a boat 12 inches. This variance is referred to as slippage.

Ventilation, its' Causes and Corrections

While often called "cavitation," ventilation is really a different effect. At times when a boat enters or leaves a sharp turn, the propeller seems to slip and lose thrust and the engine may over-speed. This problem is normally caused by air or aerated water entering the propeller. (A damaged propeller can also cause ventilation.) Ventilation can usually be corrected by one or more of the following:

Propeller Ventilation
(Fig. 4.6.2)



1. Replace the damaged or incorrect propeller with the recommended one.
2. With stern drives, set the outdrive at a lesser trim angle (trim the unit downward).

CAVITATION, ITS' CAUSES AND CORRECTIONS

Cavitation is a phenomenon that occurs in all propeller-driven craft under certain conditions. The surface of propeller blades are not perfectly flat, and as water is drawn through the blades to be discharged aft into the propeller's slip stream, the water flowing over the curved surface of the blade encounters areas of greater and less pressure.

In those areas of reduced pressure, air bubbles are formed. When they move out of the low pressure area these bubbles collapse. If they collapse while in contact with an object, such as part of the propeller blade or trim plane, the bubbles create such highly localized forces that they erode the surface of the object. In the case of the propeller, such damage is sometimes called a "burn." It may be caused by an irregularity in the propeller's leading edge, and it should be corrected by reconditioning the propeller or by replacement.

Cavitation is a normal occurrence in modern sport boats, and prop inspection should be part of routine maintenance.

PROPELLER TORQUE AND ITS' CORRECTION

Some of the more powerful motors create a considerable torque effect; that is, a twisting motion causing the boat to ride with one sheer lower than the other. This twisting reaction is caused by the direction of propeller rotation lifting one side of the boat. This causes an uneven drag, so that a boat's bow may tend to fall off in one direction or the other from the intended course given by the wheel.

Torque action may occur when maximum or close to maximum rated horsepower is applied. Any slight torque may be offset by shifting passenger or gear weight laterally to the high side of the boat.

COUNTER-ROTATING PROPELLERS

On twin engine yachts, one propeller turns in a clockwise direction while the other turns counterclockwise in order to maintain a straight course through the water.

COUNTER-ROTATING PROPELLERS
(FIG. 4.7.1)

When removing or replacing propellers, be sure to install the correct propeller on the correct drive.

1. PROPELLER SELECTION

IMPORTANT: Installed propeller must allow engine to operate at its specified maximum WOT (wide open throttle) RPM. Use an accurate service tachometer to verify engine operating RPM.

It is the responsibility of the boat manufacturer and/or the selling dealer to equip the power package with the correct propeller.

If full throttle operation is below the recommended range, the propeller must be changed to prevent loss of performance and possible engine damage. On the other hand, operating an engine above the recommended operating RPM range will cause higher than normal wear and/or damage.

After initial propeller selection, the following common problems may require that the propeller be changed to a lower pitch:

- Warmer weather and greater humidity cause an RPM loss.
- Operating in a higher elevation causes an RPM loss.
- Operating with increased load (additional passengers, additional equipment or gear, etc.).

Because of the many variables of boat design, only testing will determine the best propeller for a particular application.

2. PROPELLER INSTALLATION: V-DRIVE AND INBOARD

⚠ WARNING

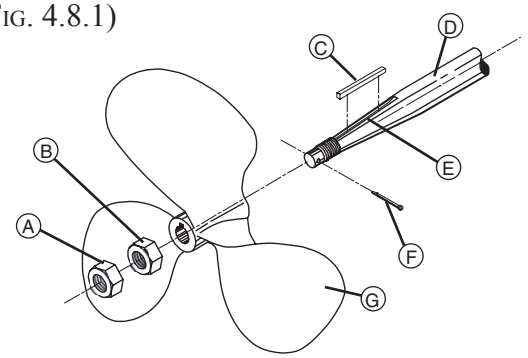
If engine is started during propeller maintenance, serious personal injury can occur.

Shut off engine, remove key, shift into neutral, and put tape over ignition switch key slot.

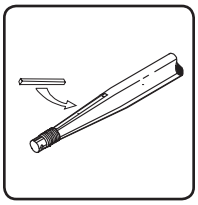
For proper rotation, the installation of propellers on inboard engine boats requires the right hand propeller to be installed on the starboard side and the left hand propeller to be installed on the port side. Install in the following manner:

Step 1: Inspect shafts and propellers to ensure the taper, keyways, keys, prop nut, jam nut and cotter pin meet specifications. **Special attention should be paid when confirming key fit. Key must fit snug in prop hub and propeller shaft. Key must fit flat in bottom of both. If the key radius does not match keyseat properly, stress risers and catastrophic failure could occur.**

PROPELLER INSTALLATION
(FIG. 4.8.1)

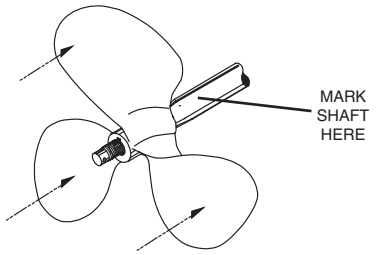


- Inspect propeller(s) to ensure the bore, diameter and pitch meet specifications for specific engine installation (diameter and pitch are stamped on the side of prop hub).



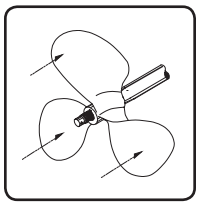
Step 2: Dry fit the propeller on the taper without the key and mark the position on the shaft with a permanent marker. **The distance between the prop and the strut shall never exceed one (1) shaft diameter.**

PROPELLER INSTALLATION
(FIG. 4.8.2)



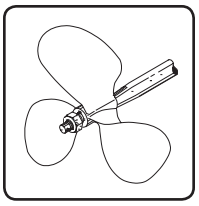
- Remove the propeller and insert the key, rotate the shaft so the key is top dead center.
- Using a clean rag, wipe the bore of the propeller with a small amount of penetrating oil.
- Apply a consistent coating of Prussian blue compound to the surface of the shaft taper. The application should be consistent and have a wet film thickness of 2 mils. (similar to a light coat of polyurethane).

Step 3: Set the propeller on the shaft and slide it up the taper with the full nut ensuring that the propeller hub runs up to the mark.



- Remove the propeller and inspect the pattern transferred from the shaft to the bore of the propeller.
- The pattern should be consistent over the full contact area.
- The pattern will not be complete, but it should show a consistent transfer over at least 80 percent of the contact area.
- If the propeller bore shows an area, with little or no transfer, remove the key from the shaft and apply some lapping compound to the shaft.

Step 4: Set the propeller on the taper with the nut set loosely. Rotate the propeller in 60 - 90 degree increments first clockwise, then counterclockwise.

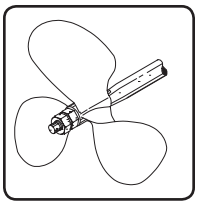


- The propeller will begin to bind as the compound is worked out from between the shaft and propeller. At this stage, clean the shaft taper and propeller bore and repeat the above steps until a transfer showing 80 percent contact is made.

Step 5: Final Installation - apply a light coat of Never Seize® to the shaft taper.

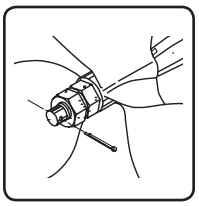
- Set the propeller on the shaft with the key ensuring that the propeller is in full contact and in the proper position on the taper.
- If the propeller is not fitted with a Propsmith® or equivalent, the propeller nut should be used to drive the propeller up the taper.
- Document right hand and left hand prop make/ model installation on the Maintenance Log (Section 8, page 8.14).

Step 6: Install the small propeller nut. Use the slugging wrench making small, but numerous hits on the wrench until the propeller is driven up the taper one quarter (1/4) turn after the nut contacts the propeller.



Step 7: Remove the slugger wrench, install the larger nut and tighten one sixth (1/6) turn after nut contacts the small propeller nut, using the slugger wrench and mallet.

- Install the cotter pin and bend each side 180°.



NOTE: Do not use the propeller blades as stops by wedging blocks of wood between the blade and the hull of the boat.

NOTE: The propeller hub may be heated to ease the removal process using a non-oxidizing gas such as propane. The hub should not be heated beyond approximately 150 degrees F.

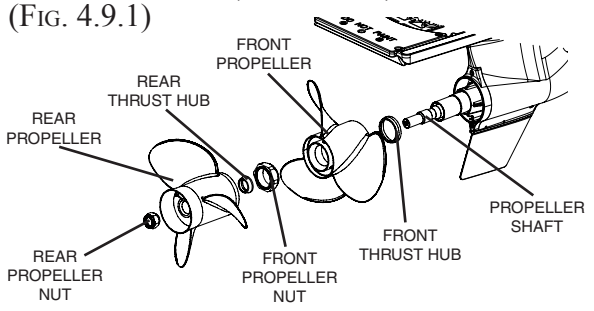
NOTICE

If the jam nut and prop nut are installed properly, the propeller should not loosen. If you tighten both nuts holding only the propeller blade, the nuts could possibly thread back on the shaft to the cotter pin. It is important that the above procedure be followed.

Shaft Diameter	Thread Size	Prop Nut	Torque Ft. Lbs.	Jam Nut Torque Ft. Lbs.
1"	3/4"	Bronze	100-125	100
1 1/4"	7/8"	Bronze	150-175	100
1 1/2"	1 1/8"	Bronze	250-275	100
1 3/4"	1 1/4"	Bronze	275-300	100
2"	1 1/2"	Bronze	325-350	100
2 1/2"	1 3/4"	Bronze	400-425	100

3. PROPELLER INSTALLATION: ZEUS DRIVE

PROPELLER PARTS (ZEUS DRIVE)
(FIG. 4.9.1)



1. Liberally coat the propeller shaft spline with one of the following Quicksilver lubricants.

NOTE: Anti-corrosion grease is for saltwater applications only.

2. Slide the front thrust hub onto the propeller shaft with the tapered side toward the propeller hub.
3. Align the splines and place the front propeller on the propeller shaft. The propeller must fit freely on the propeller shaft splines.
4. Install the front propeller nut.
5. Place a block of wood between the trim tab and the propeller.

6. Torque the front propeller nut (100 lb. ft.) using the propeller nut tool.
7. Check the propeller for rotation. The propeller must not contact the lower drive housing.
8. Slide the rear thrust hub onto the propeller shaft with the tapered side toward the propeller hub.
9. Align the splines and place the rear propeller on the propeller shaft. The propeller must fit freely on the propeller shaft splines.
10. Install the rear propeller nut.
11. Place a block of wood between the trim tab and the propeller.
12. Torque the rear propeller nut (60 lb. ft.).

B. Shafts

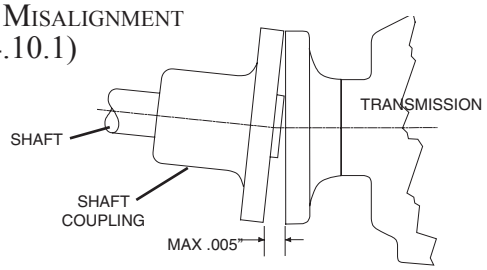
The shaft coupling is the connecting point between the shaft and the transmission/engine (Fig. 4.10.1). The alignment should be set at a maximum of .005" (0.13 mm). A slight misalignment will cause loss of power, excessive wear, noise and vibration and should not be tolerated. When checking for parallel coupling faces (the proof of proper alignment), use a feeler gauge not more than .003 to .005 of an inch thick (0.08 – 0.13 mm).

With coupling faces brought together by hand – not bolted – the feeler gauge should be tightly gripped at all points around the edges of the couplings. Next, hold the engine coupling flange stationary and rotate the shaft coupling flange 90 degrees in either direction. The feeler gauge should still be tightly gripped at all points around the edges of the couplings.

Shaft Log & Strong Seal™

The shaft log is a fiberglass tube which provides an opening through the bottom of the boat for the propeller shaft (Fig. 4.11.1). The Strong Seal™ is connected to it by a short length of special flexible hose which serves to absorb normal shaft vibration. The Strong Seal™ prevents water from leaking around the shaft and into the boat, and should be inspected routinely. Shaft alignment and straightness must be correct to assure proper operation of the Strong Seal™. Refer to the Strong Seal™ information for the seal carrier kit in the Owner's Manual Package.

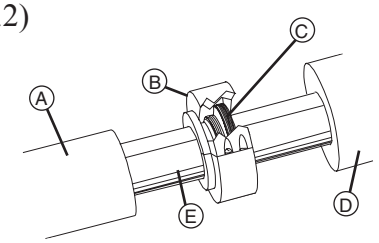
Shaft Misalignment
(Fig. 4.10.1)



C. Carrier Seal Kit

Sea Ray Sport Yachts are equipped with spare carrier seals located on the port and starboard engine shafts. Seal failure can be corrected by replacing the seal with the spare seals provided.

Carrier Seal Kit
(Fig. 4.10.2)

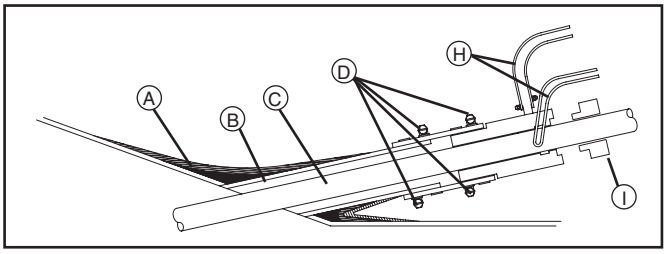


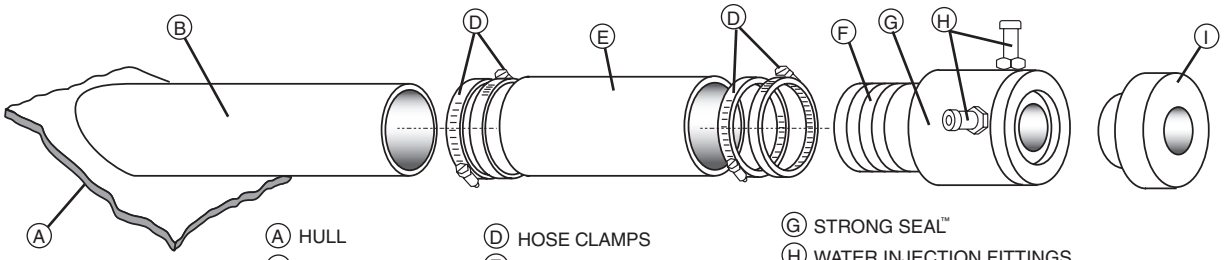
Ⓐ SHAFT LOG & STRONG SEAL
Ⓑ SEAL HOUSING
Ⓒ CARRIER SEAL
Ⓓ SHAFT COUPLING
Ⓔ PROPELLER SHAFT

To Replace the Carrier Seal:

1. Clean any accumulated dirt and scale from the exposed shaft. MAKE SURE THERE ARE NO SHARP EDGES OR BURRS ON THE SHAFT.
2. Separate the two halves of the Carrier Seal Kit housing by removing the screws. If there are two lip seals in the carrier kit, move the forward most one forward on the shaft until out of the way.
3. Remove the retaining ring from the Strong Seal™ using a small screwdriver (for a spiral ring) or snap-ring pliers (for a snap ring). Work the retaining ring around the new lip seal and move the ring forward out of the way.
4. Reassemble the empty Carrier Seal Kit housing onto the shaft just forward of the new lip seal with the small diameter facing aft. Leave the

SHAFT LOG & STRONG SEAL™ ASSEMBLY
(FIG. 4.11.1)





Ⓐ HULL
Ⓑ SHAFT LOG TUBE
Ⓒ SHAFT
Ⓓ HOSE CLAMPS
Ⓔ FLEXIBLE TUBE
Ⓕ STAINLESS STEEL BANDS
Ⓖ STRONG SEAL™
Ⓗ WATER INJECTION FITTINGS
Ⓘ SPARE SEAL & CARRIER KIT

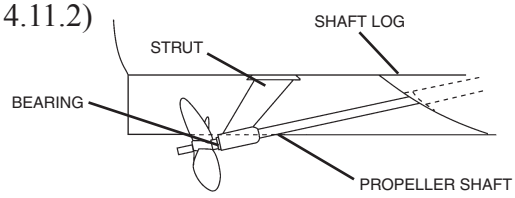
screws loose enough that the housing can move along the shaft. The Carrier Seal Kit housing is now ready to be used as a lip seal installation tool.

5. Push needle-nose pliers or a hook into the exposed body of the lip seal and pull it out of the Strong Seal™ housing. Cut the old seal off the shaft with wire cutters. BE CAREFUL NOT TO SCRATCH THE SHAFT.
6. Inspect and clean the inside of the Strong Seal™ housing and the newly exposed area of the shaft that was under the old lip seal.
7. Push the new lip seal and installation tool aft until the lip seal contacts the Strong Seal™ housing. Using a rubber mallet, tap the face of the installation tool until the lip seal is seated within the Strong Seal™ housing. You will know the lip seal is fully seated when the retaining ring groove is exposed.
8. Remove the Carrier Seal Kit housing from the shaft. Reinstall the retaining ring into its groove in the Strong Seal™ housing.
9. If the Carrier Seal Kit came with two lip seals, position the remaining lip seal back onto a convenient location on the shaft at least 2" forward of the Strong Seal™. Reassemble the Carrier Seal Kit housing around the lip seal with the smaller diameter facing forward. Tighten the screws and make sure the assembly is firmly secured on the shaft.

NOTE: As the Carrier Seal Kit is turning with the shaft and the Strong Seal™ is not, it is important that the two do not touch.

D. STRUT

STRUT
(FIG. 4.11.2)

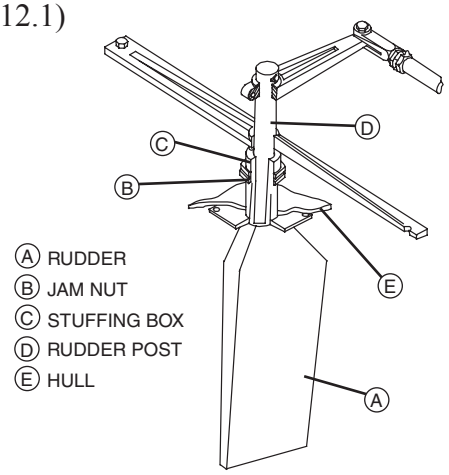


The strut is the bronze casting fastened to the bottom of the hull to support and form a bearing for the propeller shaft. A replaceable rubber bearing is inserted to minimize wear and protect the shaft where it passes through the strut hub. During lay up periods, squirt castor oil into this bearing to keep it from freezing to the shaft. **Never use machine oil or grease on rubber bearing.** Periodically check all strut fastenings to assure that they are secure.

11. RUDDER & RUDDER STUFFING BOX

The rudder is the vertical flat surface aft of the propeller that pivots about a vertical axis and changes the direction of the boat through the water. The rudder stuffing box prevents water from leaking into the boat where the rudder post enters the hull. Spot check for leaks before and after using your boat.

RUDDER & RUDDER STUFFING BOX (FIG. 4.12.1)



12. SEACOCKS & STRAINERS

Seacocks and strainers, located in the bilge area, provide cooling water to the optional generator and the A/C unit.

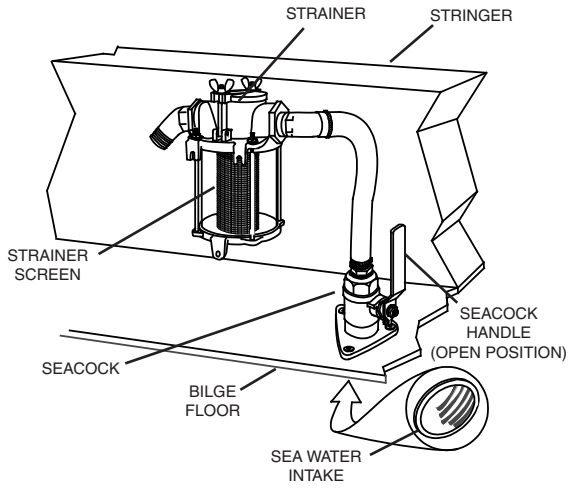
To open the seacock, turn the handle in line with water flow (vertically). To close, turn the handle against water flow (horizontally). The strainers should be inspected frequently and cleaned out when plugged. If operation of the air conditioning is excessive it is important that the A/C unit strainer is inspected more frequently than other strainers.

The seacock body should be inspected and lubricated annually.

NOTICE

While being towed, you must close all main engine and generator engine seacocks to prevent water from being forced into the engine's exhaust and causing internal damage.

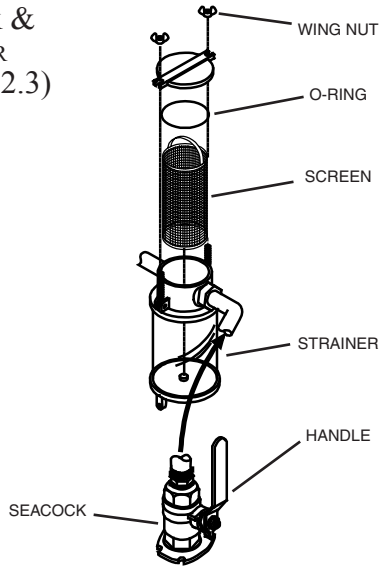
SEACOCK & STRAINER INSTALLATION (TYPICAL) (FIG. 4.12.2)



CAUTION

As a safety measure, close all seacocks when leaving boat for any length of time to impede water ingress in the event of water hose failure.

SEACOCK & STRAINER (FIG. 4.12.3)

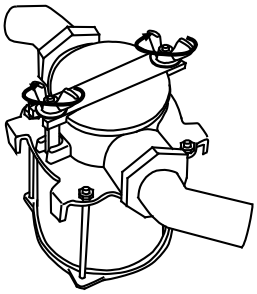


TO CLEAN THE STRAINER

1. Close the seacock by turning the handle against water flow (horizontally).

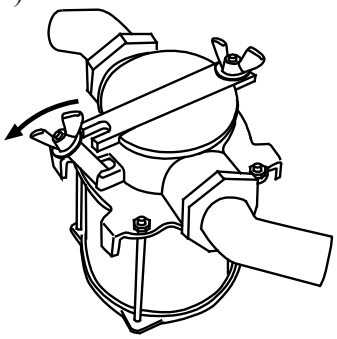
   NOTE: Some seacocks are equipped with locking tee handles which must be loosened before operating the handle.
2. Loosen wing nuts on top of strainer.

STRAINER MAINTENANCE
(FIG. 4.13.1)



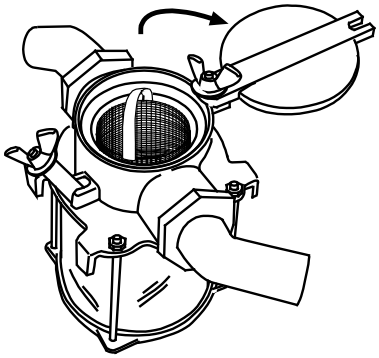
3. Release wing nut from slot in strainer cap by pulling forward.

STRAINER MAINTENANCE
(FIG. 4.13.2)



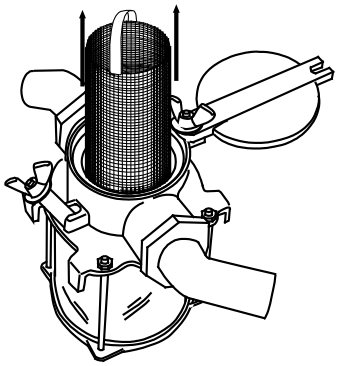
4. Rotate strainer cap clear of strainer housing.

STRAINER MAINTENANCE
(FIG. 4.13.3)



5. Remove and wash stainless steel screen.

STRAINER MAINTENANCE
(FIG. 4.13.4)



6. Replace the screen, rotate cap into position on the housing, engage wing nut into slot and tighten both wing nuts.
7. Open the seacock by turning the handle with water flow (vertically) and check for leaks.

13. HYDRAULIC POWER STEERING CONTROL

The hydraulic power steering ram ensures identical positioning of the port and starboard rudders. Check that rudder arms are tight and free of play. Ensure that fluid reservoir is up to level and filter is clean. The fluid reservoir and filter are located in the engine room along with the optional auto pilot pump. Sea Ray® recommends Sea Star hydraulic steering fluid or Dextron 3 auto transmission fluid for the power steering system.

The hydraulic power steering system uses the boat's engines to provide the "power" for the steering system, via a mechanically driven hydraulic pump.

A manual hydraulic steering system, consisting of a helm and a hydraulic cylinder (fitted with an integral servo cylinder and a power steering valve), supplies the "control" portion of the steering system.

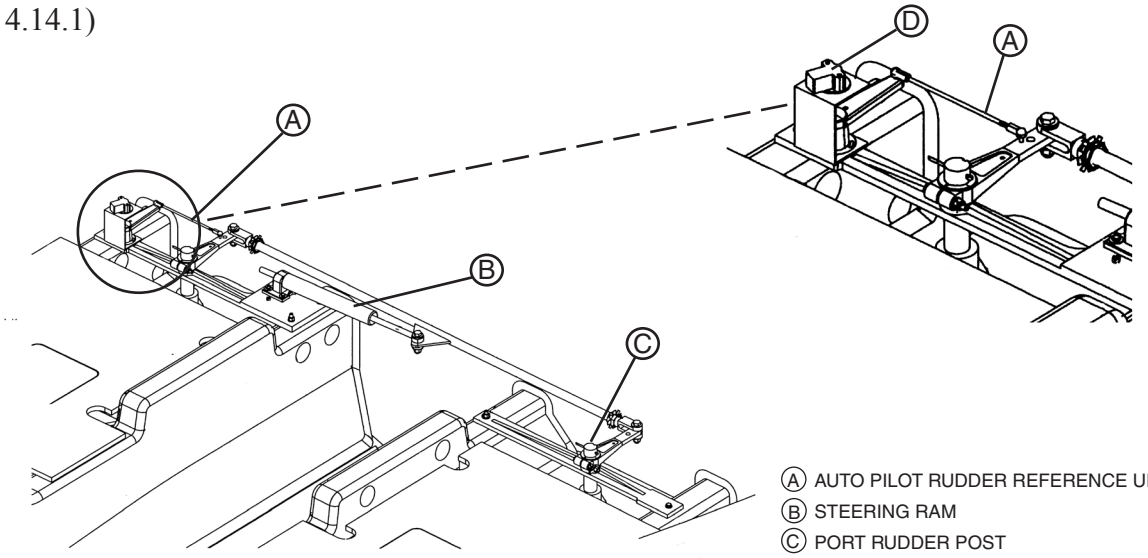
Under normal conditions, with engines running, a hydraulic oil supply is in a standby mode, ready to be directed to the steering cylinder as dictated by the steering wheel, servo cylinder and power steering valve. Turning the steering wheel left or right makes the system go from "standby" into "operating" mode and move the steering cylinder accordingly.

In the event of a power source failure, hydraulic oil from the steering helm is automatically diverted into the servo and steering cylinder, providing the helmsman with manual backup steering.

An engine room mounted oil reservoir allows easy fill and assists the in-line cooler in cooling the hydraulic oil. An in-line oil filter helps to protect the steering system components against contaminants.

REFER TO OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

HYDRAULIC POWER STEERING CONTROL
(FIG. 4.14.1)



Ⓐ AUTO PILOT RUDDER REFERENCE UNIT
Ⓑ STEERING RAM
Ⓒ PORT RUDDER POST
Ⓓ SMARTCRAFT RUDDER INDICATOR (OPTIONAL)

1. GAS FUEL SYSTEM

Section 3 - Using Your Boat contains important fueling information. Take time to read all the fuel related information in both the General Information Manual and the Specific Information Manual for your boat.

The typical gasoline fuel system consists of two fuel tanks, fuel tank vents, electric fuel valves, engine fuel supply lines, optional generator fuel supply line, and fuel fills.

The fuel tank thru hull vents serve as a pressure/ vacuum release and safety overflow. Periodically check the vent to ensure that it is not clogged.

The fuel pickup at the fuel tank has an electric fuel valve to prevent fuel from siphoning out in the event of fuel line failure.

⚠ CAUTION

Never start an engine until you are certain that fuel fumes are not present in the engine compartment or elsewhere in the boat.

A. ELECTRIC FUEL VALVE

The electric fuel valve is wired to the ignition switch. When the ignition is turned ON the valve opens, when the ignition is turned OFF the valve closes. The manual override knob on the side of the valve should be left in the NORMAL position at all times.

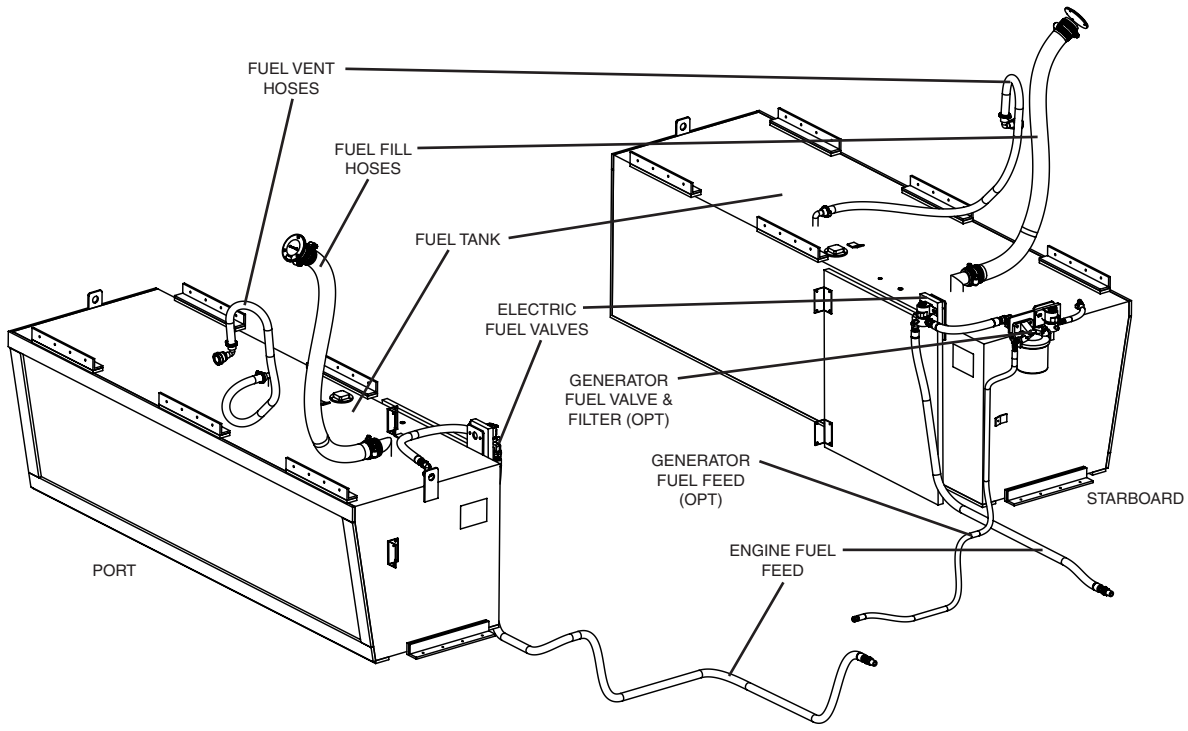
In the event of an electrical malfunction, the valve can be opened and closed manually by turning the manual override knob.

The electric fuel valve is installed in-line on the fuel hose between the fuel tank and the engine. If your boat is equipped with an optional generator, an additional electric fuel valve will be installed on the fuel hose between the fuel tank and the generator fuel filter.

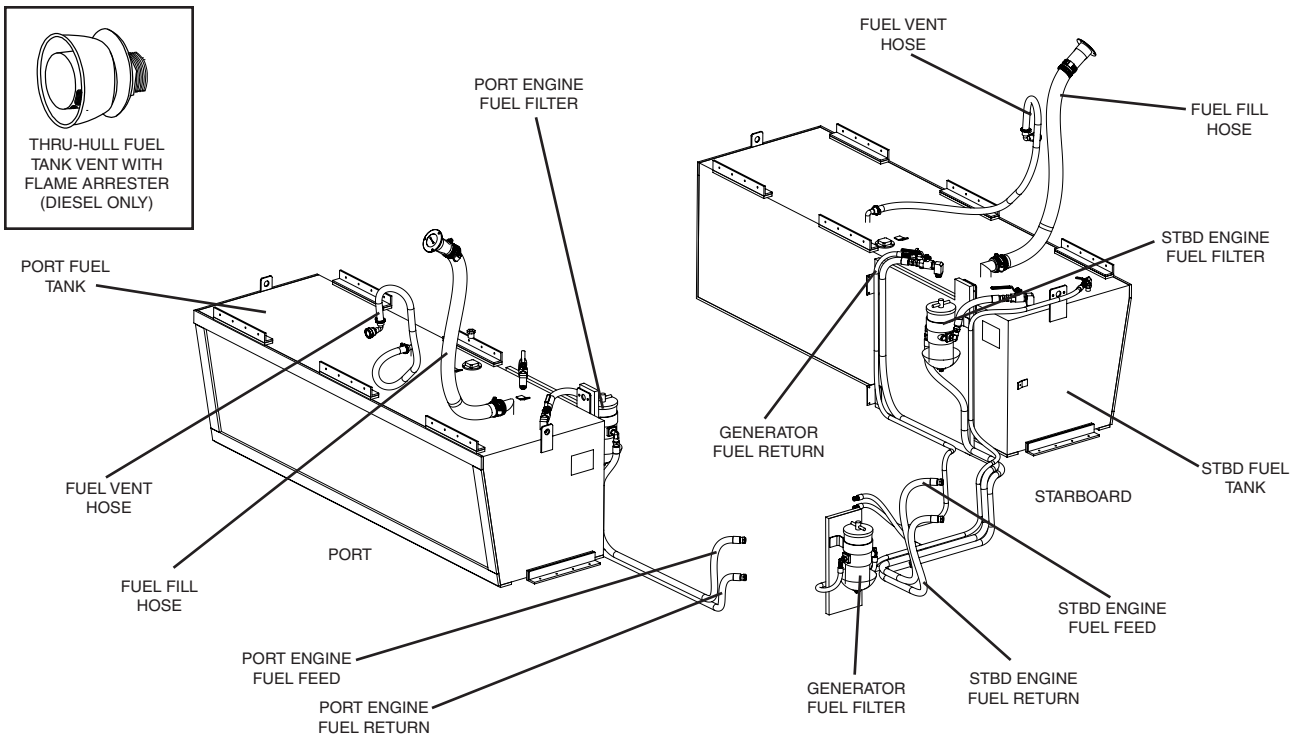
B. FUEL VENT

Sea Ray® Sport Yachts are equipped with a fuel tank vent for each tank which serves as a pressure/ vacuum release and safety overflow. The thru-hull fitting (diesel option) has a flame arrester, making

TYPICAL GASOLINE FUEL SYSTEM
(FIG. 5.1.1)



TYPICAL DIESEL FUEL SYSTEM
(FIG. 5.2.1)



it imperative that you keep the screen clean and in excellent repair. Replace the screen immediately if it becomes damaged or displaced. Periodically check the vents to assure that they are not clogged.

2. DIESEL FUEL SYSTEM

The typical diesel fuel system consists of fuel tanks, fuel tank vents, engine fuel supply and return lines, optional generator fuel supply and return lines, fuel filters and fuel fills.

A. FUEL FILTER (DIESEL)

Primary and secondary fuel filters are located on your Sea Ray® to help keep the fuel as clean as possible. The primary fuel filter is the Racor® water separating fuel filter installed in the engine compartment (Fig. 5.2.1). The secondary fuel filter is located on the engine and should be replaced in accordance with the Engine Owner's Manual.

NOTE: Use of any methanol, gasohol or alcohol based fuel additive will damage the fuel filter.

REFER TO THE ENGINE OPERATOR'S MANUAL FOR MORE DETAILED INFORMATION.

B. FUEL FILTER MAINTENANCE (DIESEL)

A major cause of poor starting or power loss is the result of a clogged filter element or a fuel system air leak. Check that the filter lid and drain plug are properly tightened.

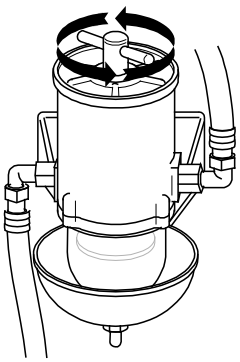
Inspect or drain the collection bowl of water daily.

1. TO DRAIN WATER:

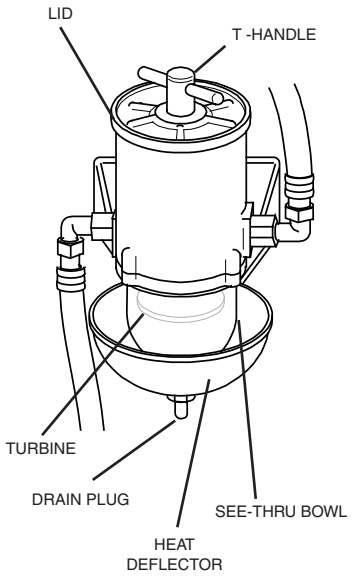
1. Shut down the engine.
2. Loosen the T handle on the top lid to break the vacuum within the filter (Fig. 5.3.1).
3. With a suitable collection container in place, remove the drain plug and allow water and contaminants to drain. (Fig. 5.3.2).
4. Replace the drain plug and, if necessary, prime the filter by removing the lid (Fig. 5.3.3) and filling the filter with clean fuel.

RACOR® FUEL FILTER MAINTENANCE

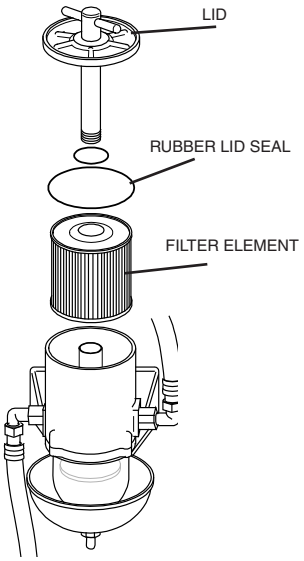
(FIG. 5.3.1)



(FIG. 5.3.2)



(FIG. 5.3.3)



5. Replace the lid and tighten the lid T handle by hand only. Do not overtighten.

Replace the filter element at regular intervals or if a power loss is detected.

2. TO REPLACE THE FILTER:

1. Shut down the engine.
2. Remove the lid .
3. Remove the old rubber lid seal and dispose of the old seal properly.
4. Apply a coating of clean fuel or motor oil to the rubber lid seal supplied with the new element.
5. Place the new seal in position on the lid.
6. Remove the filter element by holding the molded handle and slowly pulling upward with a twisting motion.
7. Insert the new filter element with a slow downward twisting motion.
8. Fill the filter with clean fuel, then replace the lid. Tighten the lid T handle by hand only. Do not overtighten.
9. Start the engine and check for any leaks.
10. Correct any leaks with the engine shut down.

It is recommended that spare filter elements be carried aboard as contaminated fuel can easily plug a filter.

REFER TO THE ENGINE OPERATOR'S MANUAL FOR MORE DETAILED INFORMATION.

3. FUELING PRECAUTIONS

Certain precautions must be carefully and completely observed every time a boat is fueled, even with diesel fuel. Diesel fuel is nonexplosive but it will burn.

A. STATIC ELECTRICITY AND THE FUEL SYSTEM

There is a danger that static electricity can ignite gasoline vapors that have not been ventilated outside an enclosed area. Use extreme caution when fueling your boat from a source outside the regular venues, (e.g. marinas, fuel service stations.)

Your boat has safety features that can be circumvented by not adhering to standard fueling practices. Your boat's bonding system protects it from creating and discharging static electricity.

Your boat must be in contact with the water or a land based grounding system. Here are some helpful suggestions to keep you safe from static electricity while refueling your boat.

- NEVER fuel your boat in unsafe conditions such as: suspended on a sling or in a situation that increases the likelihood of static discharge.
- NEVER use homemade containers to fill your fuel tank.
- Fuel carried on board outside of a fixed fuel system should be stored in an approved container or in a portable tank such as provided for outboard engines and be stowed safely outside of the engine or living compartments.
- Shutdown the engine, motors and fans prior to taking on fuel. Any ignition sources should be extinguished before filling the fuel tank.
- Close all ports, windows, doors, and hatches.
- Fueling should never be done at night except in well-lighted areas.
- Always keep the fuel nozzle in contact with the fuel fill plate or the edge of the fuel tank opening throughout the filling process.
- Allow areas where gasoline vapors could collect to be ventilated before starting the engine(s).
- Wipe any spillage completely and dispose of rags or waste on shore.
- Secure the fill cap tightly.
- Fuel tank should never be filled to capacity. Allow for fuel expansion.
- Portable tanks should only be filled while on the ground; never on board the boat.

B. General:

- Check fill plate label to ensure fuel is placed only in fuel tank. Fuel fill plates are typically located on the port and starboard mid or aft deck areas.
- Avoid spills.
- Know your fuel capacity and consumption. Record the amount of fuel used since your last fill up, and compute the engine's hourly fuel usage. As a fuel gauge backup check, deduct the average hourly fuel usage from fuel tank capacity.
- Observe the "Rule of Thirds": one-third fuel for trip out, one-third for return and one-third for reserve.
- Allow an additional 15 percent fuel reserve when operating in rough seas.

C. Before and During Fueling Checklist:

- Fire extinguisher – close at hand.
- Mooring – boat tied securely to fueling pier.
- Crew – at least one knowledgeable person present.
- Passengers – unnecessary people off the boat.
- Engines – stopped.
- Electrical equipment, including blowers – power off.
- Windows, doors, hatches – closed.
- Smoking material – extinguished.
- Inboard tanks – grounded.
- Filler pipe – marked GAS or DIESEL.
- Fuel nozzle – in contact with filler pipe to prevent static sparks.
- Fill level – fill less than rated capacity of tank; allow for fuel expansion.
- Trim – fuel weight distributed equally.

D. After Fueling Checklist:

- Windows, doors, hatches – open.
- Sniff test – if fuel fumes remain, operate blowers until fumes are gone.
- Fuel tank – secure filler cap.
- Spills – wipe; dispose of rags ashore.

4. Fuel Recommendations

⚠ CAUTION

Never start an engine until you are certain that fuel fumes are not present in the engine compartment or elsewhere in the boat.

The quality of the fuel is very important for satisfactory engine performance and long engine life. Care should be taken to select fuels having the octane rating recommended for the engine, as indicated in the owner's manual, for proper operation. Fuel should be clean and free of contamination. Your fuel tanks should be kept full of fuel whenever possible. This will reduce the amount of water condensation and reduce the possibility of contamination.

NOTICE

GASOLINE RECOMMENDATIONS

Minimum octane rating of 87 AKI.

The use of improper gasoline or additives can damage your fuel system and is considered misuse of the system. Damage caused by improper gasoline or additives WILL NOT be covered under warranty.

Ethanol-Blended Fuels

Ethanol is an oxygenated hydrocarbon compound that has a high octane rating and therefore is useful in increasing the octane level of unleaded gasoline.

The fuel-system components of your Mercury engine(s) have been tested to perform with the maximum level of ethanol blended gasoline (10% ethanol) currently allowed by the EPA in the United States.

Special precautions should be considered with the use of fuel containing ethanol in your system. Fuels with ethanol can attack some fuel-system components, such as tanks and lines, if they are not made from acceptable ethanol compatible materials. This can lead to operational problems or safety issues such as clogged filters, leaks or engine damage.

Your boat was manufactured, and shipped from the factory, with ethanol-compatible materials. Before introducing gasoline with ethanol into your fuel tank, ask your dealer if any components have been added or replaced that are not recommended by Sea Ray®, Mercury or may not be ethanol-compatible.

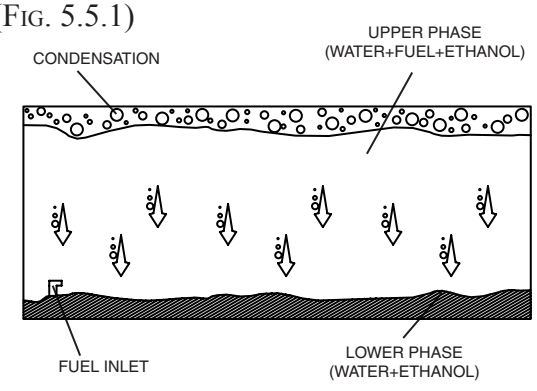
Filling the tank

It is best to maintain a full tank of fuel when the engine is not in use. This will reduce air flow in and out of the tank due to changes in temperature as well as limiting exposure of the ethanol in the fuel to humidity and condensation.

Phase Separation

Humidity and condensation create water in your fuel tank which can adversely effect the ethanol blended fuel. A condition called phase separation can occur if water is drawn into the fuel beyond the saturation point. The presence of water in the fuel beyond the saturation level will cause most of the ethanol in the fuel to separate from the bulk fuel and drop to the bottom of the tank, significantly reducing the level of ethanol in the fuel mixture in the upper level (phase). If the lower level (phase), consisting of water and ethanol, is deep enough to reach the fuel inlet it could be pumped directly to the engine(s) and cause significant problems. Engine problems can also result from the reduced ethanol/fuel mixture left in the upper phase of the tank.

Example of Phase Separation
(Fig. 5.5.1)



ADDITIVES

There is no practical additive known that can prevent or correct phase separation. The only solution is to keep water from accumulating in the tank.

If phase separation does occur, your only remedy is to drain the fuel, clean and dry the tank completely and refill with a fresh, dry load of fuel.

FUEL FILTERS

Mercury already provides the appropriate level of filtration to protect the engine from debris. The addition of another in-line filter to the system will create a possible flow restriction that can starve the engine(s) of fuel.

As a precaution, it is advisable to carry extra on-engine filters in case filter plugging from debris in the fuel tank becomes a problem during boating.

MAINTENANCE

Periodically inspect for the presence of water in the fuel tank. If any is found, all water must be removed and the tank completely dried before refilling the tank with any fuel containing ethanol.

STORAGE

Long periods of storage and/or non-use, common to boats, create unique problems. When preparing to store a boat for extended periods, of two months or more, it is best to completely remove all fuel from the tank. If it is not possible to remove the fuel, maintaining a full tank of fuel with a fuel stabilizer added to provide fuel stability and corrosion protection is recommended.

⚠ CAUTION

The use of fuels containing ethanol higher than 10 present (E-10) can damage your engine and/or fuel system and will void the warranty.

E-85 FUELS COULD SERIOUSLY DAMAGE YOUR ENGINES AND MUST NEVER BE USED.

REFER TO THE ENGINE MANUFACTURER'S MANUAL IN YOUR OWNER'S MANUAL PACKAGE FOR COMPLETE INSTRUCTIONS AND WARRANTY INFORMATION.

The information in this section refers primarily to Sea Ray Sport Yachts with a conventional hard wired electrical system. For boats with the multiplexed power distribution system, refer to your Specific Information Manual for applicable information.

1. DC ELECTRICAL SYSTEM

The 12 volt direct current (DC) electrical system (similar to that in your car or truck) derives its power from the batteries. Batteries are kept charged by the engine-driven alternator and/or AC converter. The battery voltage is indicated by the voltmeters on the main distribution panel, located in the cabin, and control station instrument panel. The batteries supply power to the circuit breakers on the main DC breaker panel in the engine room. This panel contains the breakers which supply power to the control station breaker panel and salon DC distribution panel. The 12 volt dash electronics fuse panel is protected by the , ELECTRONIC CONTROL breaker on the main DC breaker panel located on the aft bilge component board.

The negative terminal of each bank of batteries connects to the main DC negative bus which in turn connects to the negative ground studs of the propulsion engines and the generator. This “negative ground system” is the approved system for marine DC electrical systems.

⚠ DANGER

DO NOT USE JUMPER CABLES IN THE ENGINE COMPARTMENT.

They can cause an explosion from sparks.

⚠ DANGER

A battery will explode if a flame or spark ignites the free hydrogen given off during charging.

Never use an open flame or strike sparks in the battery area.

⚠ CAUTION

To prevent arcing or damage to the alternator, always disconnect battery cables before doing any work on the engine’s electrical system.

2. BATTERIES

The batteries installed in your boat have been selected for their ability to furnish starting power based on engine and generator starting requirements, as well as their ability to power the DC accessories attached to the electrical system. Refer to the Specific Information Manual for the reccomended batteries for your boat.

A. TO REMOVE THE BATTERY CABLES:

1. Turn OFF all items drawing power from the batteries.
2. Turn OFF the "CONVERTER" breaker at the main distribution panel.
3. Turn OFF battery solenoid switches.
4. Remove the negative cable first, then the positive cable. To replace the cables, first replace the positive cable, then the negative.

B. BATTERY MAINTENANCE

- Check the fluid levels in the cells approximately every 4 weeks, and more often during the summer and in hot zones.
- The fluid level must be between the lower and upper markings.
- Replenish only with distilled water. Do not use metal funnels.
- Coat battery terminal clamps with silicone grease. Keep battery clean and dry.

Only use a battery charger designed to charge automotive/marine type batteries when batteries are disconnected from the boat’s electrical circuit.

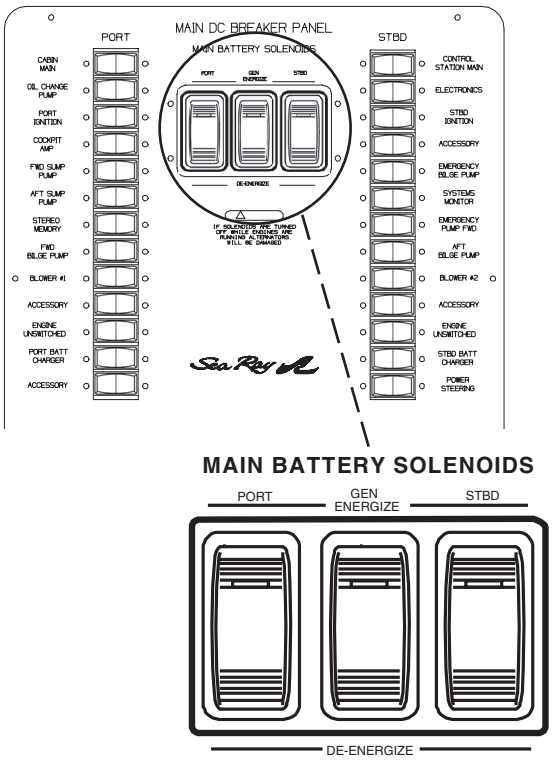
3. MAIN BATTERY SWITCHES AND SOLENOIDS

There are two sets of battery solenoid switches for the 12 volt DC systems. One is located on the DC Breaker Panel located on the engine room component board, adn one is located on the DC distribution panel in the cabin. The switches control the battery solenoids which are located in the Main Disconnect enclosure.

When the switches are in the OFF position all 12 volt current to the engines and accessories are turned off except power to the bilge pumps and other line side circuits (i.e. systems monitor, stereo memory, blowers, etc.). The battery solenoids must be ON to start the engines or generator. Turn battery solenoids OFF when leaving boat for extended duration.

NOTE: The bilge pumps, emergency bilge pumps, bilge blowers, stereo memory and systems monitor CANNOT be turned OFF with the battery solenoid switches. The entire remaining DC system CAN be turned OFF with the battery solenoid switches.

BATTERY SOLENOID SWITCHES (MAIN DC BREAKER PANEL) (FIG. 6.2.1)



4. MAIN DC BREAKER PANEL

The main DC breaker panel (Figure 6.4.1) is located on the forward engine room component board . The panel contains breakers for various equipment throughout the boat.

The bilge pumps, emergency bilge pumps, sump pump, battery chargers and stereo memory remain energized at all times and CANNOT be turned OFF with the battery solenoids. The entire remaining DC system CAN be turned OFF with the battery solenoids.

⚠ DANGER

Use ONLY Marine Rated parts to replace such items as starters, distributors, alternators, generators, etc. Do not use Automotive Parts because they are not ignition protected and could cause a fire or explosion.

⚠ CAUTION

Always disconnect battery cables before doing any work on the engine's electrical system or alternator wiring to prevent arcing or damage to the alternator.

5. IGNITION PROTECTION

All electrical components in the engine compartment must be ignition-protected to avoid the possibility of creating sparks in a gasoline environment.

⚠ DANGER

GASOLINE VAPORS CAN EXPLODE

Use ONLY Marine-rated parts to replace such items as starters, distributors, alternators, generators, etc.

Do not use automotive parts for these components or any jumper cables because they are not ignition-protected and could cause a fire or explosion.

Protective terminal covers, such as rubber boots on electrical connections, must be in place when engine is operating or when working in the engine compartment.

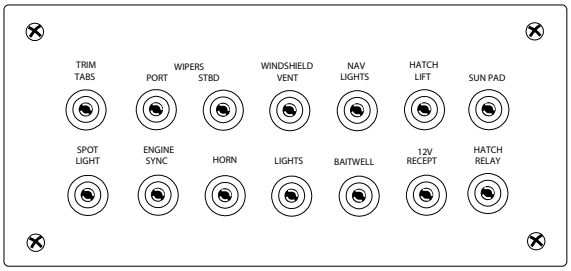
Jumper cables are not ignition-protected. DO NOT USE jumper cables in the engine compartment. The engine compartment may accumulate dangerous explosive gasoline fumes/vapors and hydrogen gas from batteries being charged. A spark produced when connecting a jumper cable can cause an explosion.

6. CONTROL STATION BREAKER PANEL

The control station breaker panel is located behind the kick panel door below the steering wheel.

In the event one of the breakers trip, determine and correct the fault, then reset by depressing the tripped breaker.

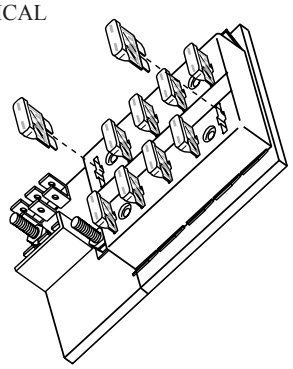
CONTROL STATION BREAKER PANEL (TYPICAL) (FIG. 6.3.1)



See Specific Information Manual for details for your boat

7. ELECTRICAL SYSTEM FUSE BLOCKS & BREAKERS

FUSE BLOCK, TYPICAL (FIG. 6.3.2)



Fuse blocks utilizing automotive type blade fuses are used to provide overload protection.

Control Station Fuse Block: Located behind the access panel below the control station switch panel. It can be accessed by a door directly below the helm. This fuse block protects the VHF radio, radar, autopilot and other electronic accessories.

Cabin Fuse Block: Located on the main distribution panel accessory board behind the 12 volt DC distribution panel in the salon. This fuse block provides power to the carbon monoxide monitors and TV antenna amplifier.

In the event it becomes necessary to replace a fuse or an electrical breaker, REPLACE THE FUSE OR BREAKER ONLY WITH A FUSE OR BREAKER OF THE SAME RATING. The amperage is marked on the fuse or breaker.

If a fuse or breaker is replaced with one of lower amperage, it will be insufficient to carry the electrical load of the equipment it is connected to and cause nuisance tripping or blowing.

⚠ WARNING

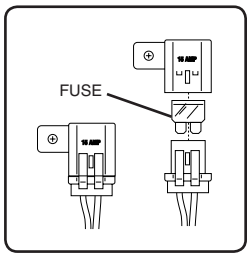
Use of higher amperage fuses or breakers is a fire hazard.

Use fuses and breakers having the same amperage rating as the original or as specified.

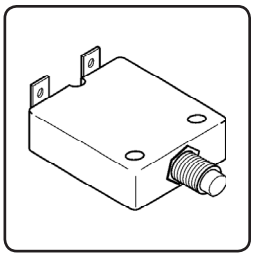
Conversely if a fuse or breaker is replaced with one of higher amperage, it will not provide adequate protection against an electrical malfunction and could create a possible fire hazard.

It is recommended that you carry spare fuses and breakers.

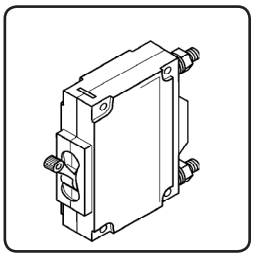
Some of the various types of breakers used on your boat are as follows:



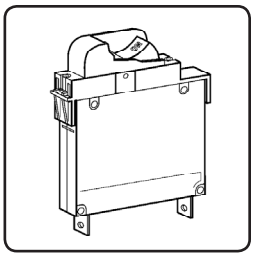
This type is an in-line fuse holder and uses an automotive-type blade fuse.



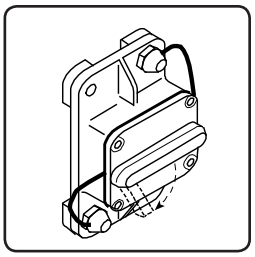
This type of breaker is found on the control station DC breaker panel located behind the access panel below the control station switch panel. These breakers protect the trim tabs, wipers, windshield vent, navigation lights, hatch lift, spot light, engine synchronizer, horn, instrument lights, 12V receptacle and accessories.



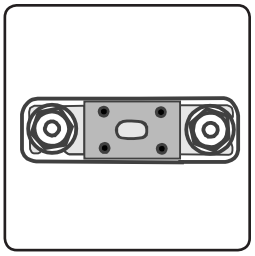
This type of breaker is typically found on the main distribution panel. It selects the electrical power source, either from the generator or from shore power.



This type of breaker is found on the main DC breaker panel. It is used to protect the bilge pumps, sump pumps, bilge blowers, control station main, electronics, systems monitor, oil change pump, stereo memory and accessories. This is a manual reset breaker. It can be turned off by inserting a small screwdriver in the slot on the rocker switch.



This type of breaker is used to protect high amperage equipment. They are found in the bilge and cockpit.



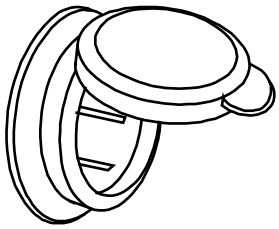
This type is a current limiting fuse which is used to isolate faults in battery operated systems and equipment (motor circuits, panel feeders, etc.).

8. 12 Volt Accessory Receptacle

Your boat has a 12 volt accessory receptacle at the helm and one in the galley. The receptacle is a cigarette lighter style plug that may be used with any 12 volt accessories using this type of plug.

See the Specific Information Manual for specific locations for your boat.

12 Volt Accessory Receptacle
(Fig. 6.4.1)



9. AC System

NOTE: Actual usage of equipment will depend on the amperage output of the power source available.

⚠ DANGER

EXTREME HAZARD – Swimming near a boat operating on AC electrical system can lead to severe shock and death. Never swim or allow swimming when AC system is in use.

Line voltage from the shore power is shown by the voltmeter on the main distribution panel. The main breakers may trip if there is a surge in line voltage, an electrical storm or an on board system overload. The main breaker interrupts both the neutral and hot feeds in the AC circuit to prevent equipment damage due to internal overloads and external surges.

120 Volt / 60 Hz Wiring (Standard System)

⚠ CAUTION

Never operate 120V shore power at less than 110 V.

The 120 volt wiring installed on Sea Ray® boats consists of three (3) color-coded wires. The black wire is the “hot” feed, white is the common, or neutral, and the green wire is the ground. All branch

breakers and switches for AC equipment are installed on the "hot" wire. The green conductor of the shore power is connected through the galvanic isolator and then connected to the AC grounding bus bar behind the main distribution panel.

220 Volt / 50 Hz Wiring (Optional System)

⚠ CAUTION

Never operate 220V shore power at less than 208 V.

The 220 volt / 50Hz wiring installed on Sea Ray® boats consists of three (3) color-coded wires. The brown wire is the "hot" feed, light blue is the common, or neutral, and the green wire is the ground. All branch breakers and switches for AC equipment are installed on the "hot" wire. The green conductor of the shore power is connected through the galvanic isolator and then connected to the AC grounding bus bar behind the main distribution panel.

10. Shore Power

A. Shore Power Cords

Sea Ray® Sport Yachts are equipped with either dual 30AMP/ 120V/60 cycle or a single 50AMP/ 240V/60 cycle shore power cord(s) for hookup to dockside power. The cord(s) are stored in the transom storage box.

B. Main Shore Power Breaker Box

The 120VAC main shore power breaker(s) are located on the starboard wall of the transom storage box above the shore power inlet(s).

The breaker must be ON to operate the shore AC power system.

C. Shore Power

The 120 volt AC main distribution panel distributes the required voltage for all the boat's AC equipment and accessories. It is very important to know and understand where the power originates and how the power is distributed to the different voltage equipment and accessories.

To access the shore power see Section 3 - Using Your Boat.

11. Generator

Sea Ray® strongly urges you to fully comply with the manual provided by the generator manufacturer. **The generator and its components are warranted separately by the generator manufacturer, NOT Sea Ray®**. Follow the recommended maintenance and warranty schedule in your Generator Operator's Manual included in the Owner's Manual Package. Generator abuse or improper maintenance may adversely affect claims made under generator manufacturer separate warranty.

⚠ CAUTION

Do not run the generator in an enclosed area, such as a closed boathouse, as there is a possibility of buildup and inhalation of carbon monoxide.

Generator Operation

The procedures for starting, stopping and switching between generator and shore power are explained in Section 3 • Using Your Boat.

12. Servicing the Main Distribution Panel

NOTE: Servicing should be referred to a qualified electrician.

⚠ WARNING

Disconnect the power cable from power source before performing maintenance.

To Replace a Faulty Component on the Main Distribution Panel:

1. Turn all breakers OFF.
2. Unplug the shore power.
3. Remove screws from all sides except the hinged side of panel. The main distribution panel is hinged to swing open for servicing.
4. Reverse the procedure for closing the panel.

13. Battery Charger/Converter

The battery charging unit located on the bilge component board is fully automatic and is designed specifically for the marine environment. The high frequency characteristic has allowed these chargers to achieve a huge size and weight reduction over previously used equipment. Commonly called high frequency or smart chargers, these units bring a new sophistication to the battery charger field.

⚠ WARNING

Never block air circulation through the unit. Never store any gear on top of the units.

NOTICE

Leave the converter running at all times to maintain the 12 volt system voltage.

Charging characteristics contain four (4) modes:

- **Boost Mode** - this is initiated at power up and provides the chargers full-rated current to the battery bank at a level of 14.4V until battery reaches 90% of full charge.
- **Normal Mode** - this stage immediately follows the bulk charge mode. It maintains the battery voltage at the bulk charge voltage level, but gradually decreases the current as the battery accepts the charge until it reaches a predetermined current level.
- **Float Mode** - this stage is designed to hold the battery at a safe, low voltage (typically 13.2V) providing up to the chargers full rated amperage to accommodate DC load requirements. The charge will remain in this mode until the 12 volt system is activated.
- **Equalize Mode** - this stage activates for 15 minutes every 21 hours. When the converter/charger is in the float mode the voltage is increased to 14.4 volts which mixes the battery electrolyte to prevent battery stratification.

Note: Leave the charger/converter turned ON at all times to maintain battery voltage level.

Note: Check monthly to ensure that water level in the batteries is properly maintained.

REFER TO OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

14. Ground Fault Interrupter Receptacle (GFI)

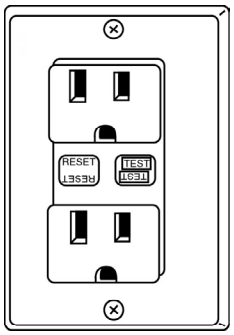
At least one ground fault interrupter receptacle is installed in the boat. Please read and understand the CAUTION block for GFI receptacles.

⚠ CAUTION

Persons with heart problems or other conditions which make them susceptible to electric shock may still be injured by ground faults on circuits protected by the GFI receptacle. No safety devices yet designed will protect against all hazards or carelessly handled or misused electrical equipment or wiring.

The GFI receptacle is designed to protect people from the line-to-ground shock hazards which could occur from defective power tools or appliances operating from this device, or from down-line outlets protected by it. It does not prevent line-to-ground electric shock, but does limit the time of exposure

GFI OUTLET
(FIG. 6.7.1)



to a period considered safe for otherwise normally healthy persons. It does not protect persons against line-to-line or line-to-neutral faults.

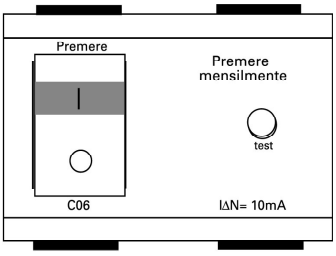
The GFI receptacle does not protect against short circuits or overloads. This is the function of the circuit breaker.

INTERNATIONAL RECEPTACLE

If equipped, all readily accessible 220V outlets are protected by a Residual Current Circuit Breaker (RCCB). This current breaker includes a test switch to verify proper operation. Its function is similar, but not identical to the 120V GFI.

REFER TO OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

RCCB OUTLET
(FIG. 6.7.2)



15. ELECTROLYTIC CORROSION AND ZINC ANODES

Electrolytic corrosion of metals on power boats can result in rapid and serious deterioration of metal parts. You must set a regular schedule and look for the possibility of galvonic action (the deterioration of metals due to dissimilar characteristics when placed in salt water). It is your responsibility to check for and replace parts damaged due to galvonic deterioration. Refer to your Sea Ray® dealer to investigate the source of stray corrosive currents.

Zinc plates are installed on the transom and trim tabs to protect underwater hardware. Zinc, being much less "noble" than copperbased alloys and aluminum used in Sea Ray® underwater fittings, will deteriorate first and protect the more noble parts.

Zinc anodes generally require replacement about once a year. (In salt water areas, replace every six (6) months). The need to replace anodes more frequently may indicate a stray current problem within the boat or at the slip or mooring. If zinc anodes do not need replacing after one year, they may not be providing proper protection. Loose anodes or low-grade zinc may be the problem.

DO NOT PAINT BETWEEN THE ZINC AND THE METAL IT CONTACTS, AND DO NOT PAINT OVER THE ZINC.

When an AC shore power system is connected to the boat, the underwater metal fittings will, in effect, be connected through the water to grounded metals ashore. This results in the zincs being consumed at a faster rate unless the marina maintains a protective system to prevent this. When the marina provides a zinc anode in the water bonded to the metal outlet box on the dock, zinc loss on the boat will be reduced. Do not connect this zinc to the boat's ground system.

It is extremely important that all electrically-operated DC equipment and accessories be wired so that the ground polarity of each device is the same as that of the battery. Your boat has a negative ground system. The zinc anode is connected to every metal item in the boat (fuel tanks, underwater gear, etc.) via the green bonding wire.

Electrolysis can also be caused by "stray currents" due to a fault in an electrical item, even though correctly grounded. Sea Ray Sport Yachts are equipped with either a galvonic isolator or an isolation transformer to reduce this possibility.

⚠ CAUTION

Never disconnect the green wire (safety ground) from the engine terminal.

NOTICE

DO NOT PAINT BETWEEN THE ZINC AND THE METAL IT CONTACTS, AND DO NOT PAINT OVER THE ZINC.

16. Marine Electronic Cathodic Anti-Corrosion System

The automatically controlled Cathodic Anti-Corrosion System (gas engines only) for marine installation protects underwater metals from the effects of corrosion and electrolysis on stern drives. The system components are designed for marine service. DO NOT PAINT THE MERCATHODE® SYSTEM.

The anode and reference electrode are attached to the electrode assembly under each stern drive unit. The solid state controller is mounted within a plastic housing on the transom in the bilge.

Maintenance

The Mercathode® system must be tested to ensure adequate output. The test should be performed every 100 hours of use or annually. Contact your authorized Sea Ray® dealer to arrange for this test. Refer to the engine operator's manual for more detailed information.

Not all options and accessories described in this manual are available on all boats and models. See your authorized Sea Ray® dealer for information on options and accessories available for your boat.

1. CARBON MONOXIDE MONITOR

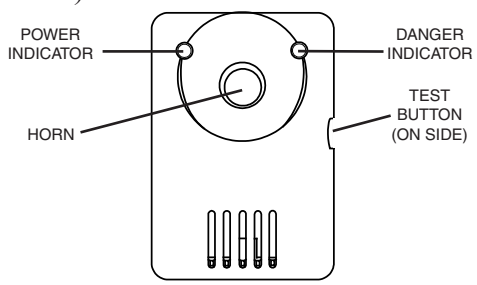
Sea Ray Sport Yachts are equipped with carbon monoxide (CO) monitors in the cabin and enclosed berths or staterooms. The CO monitor is an electronic instrument that detects carbon monoxide. When there is a buildup of CO in the cabin, the monitor will alert the occupants by flashing a DANGER light and sounding an alarm. The CO monitor is powered through a breaker on the Main Distribution panel in the galley.

It is important that you read and understand the CO monitor information and operating instructions. It is extremely important that you become familiar with the CO monitor and its functions.

TESTING THE CO MONITOR

Test the monitor on your boat at manufacturers required intervals by pushing the TEST button on the side of the unit. If the unit is operating correctly both audible and visual warning indicators will be activated.

CARBON MONOXIDE MONITOR (FIG. 7.1.1)



⚠ CAUTION

This detector will only indicate the presence of carbon monoxide gas at the sensor. Carbon monoxide may be present in other areas.

⚠ DANGER

Actuation of the CO monitor indicates the presence of carbon monoxide which can be FATAL.

EVACUATE THE PREMISES IMMEDIATELY. DO A HEAD COUNT TO CHECK THAT ALL PERSONS ARE ACCOUNTED FOR. CALL THE NEAREST FIRE DEPARTMENT AND ASK THEM TO DETERMINE THE SOURCE OF CARBON MONOXIDE. DO NOT REENTER PREMISES UNTIL IT HAS BEEN AIRED OUT AND THE PROBLEM IS CORRECTED.

⚠ CAUTION

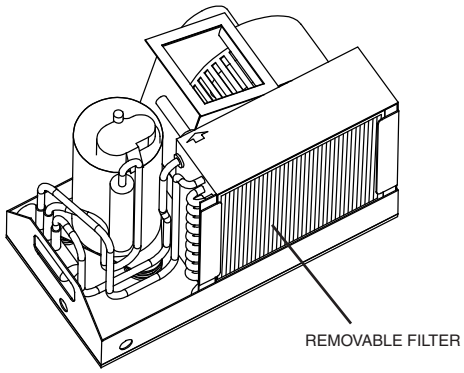
To reduce the risk of carbon monoxide poisoning, test the monitor operation when not in use for 10 days or more.

2. AIR CONDITIONING & HEATING

The air conditioning/heating system in your Sea Ray® is of the size and capacity best suited for the size of your boat.

The system is fitted with a return air filter that should be cleaned once a month. Refer to the Specific Information Manual for the system access hatch location for your boat. To remove the air filter for cleaning, slide filter out of the compressor/blower unit.

TYPICAL AIR CONDITIONING COMPRESSOR/ BLOWER (FIG. 7.1.2)



The system is cooled to maintain optimal operating temperature by a raw water pump. The pump draws water through a seacock in the bilge and filters it through a sea water strainer. (The sea water strainer should be inspected and cleaned frequently. To clean the strainer, refer to Section 4 • Bilge and

Underwater gear) The water passes through the air conditioning/heating unit, then flows overboard.

TO START SYSTEM:

1. Make sure the seacock for the cooling pump is open.
2. Turn ON the AIR CONDITIONER circuit breaker on the Main Distribution panel.
3. Follow the instructions in the Air Conditioner/ Heater manual for control pad operation.

REFER TO OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

3. WATER SYSTEM

If installed, the fresh water system consists of a water tank, 12 volt water pump and water system filter.

The fresh water system is activated by the WATER PUMP switch on the switch panel at the helm.

To begin initial operation:

1. Fill the water tank from a source known to provide safe, pure drinking water by removing the cap marked WATER located on the port mid ship deck and inserting the water hose nozzle in the opening. Do not mistake the fuel fill or the waste plate for the water tank fill cap.
2. Turn ON the FRESH WATER PUMP switch, located on the control station switch panel.
3. Open the sink faucet to allow any air trapped in the water line to dissipate.
4. Shut off faucet as flow becomes free of air. Shutting off the faucet will cause the pump to shut off. As long as the water pump and battery switches are on, the pump will automatically provide water on demand.

A. SANITIZING THE WATER SYSTEM

If the fresh water system has not been used for some time, or if you suspect that it has been contaminated, then it should be sanitized. Your marine dealer may have a water treatment additive that can be used to sanitize the system. Follow the instructions provided with the additive.

If a water treatment additive is not available, the following steps may be followed to sanitize the water system:

1. Pump the water tank empty. Shut OFF the Fresh Water Pump breaker.
2. Determine the capacity of your water tank (your standard water tank holds 24 gallons (90.8 liters). You will need approximately one (1) gallon of weak bleach solution for each fifteen (15) gallons of tank capacity.
3. Prepare the proper amount of a weak bleach solution by mixing 1/4 cup of unscented household chlorine bleach per gallon of water.
4. Pour weak bleach solution into the water tank. Remember, use about one (1) gallon of weak bleach solution for each fifteen (15) gallons of tank capacity.
5. Fill the remainder of the tank with fresh, clean water. This will further dilute the weak bleach solution.
6. Switch ON the Fresh Water Pump breaker, then turn on the faucets and allow the air to be exhausted from the plumbing system. By doing this, the entire fresh water system will be filled with a sanitizing solution.
7. Allow the sanitizing solution to stand in the water system for three (3) hours.
8. Pump the water tank empty.
9. Fill the water system completely with fresh, clean water. Turn on the faucet and permit the entire contents of fresh, clean water to run through the system. This will flush the sanitizing solution out of the plumbing.
10. Fill the water system again, with fresh, clean water, and turn on the faucet to permit the air to dissipate.

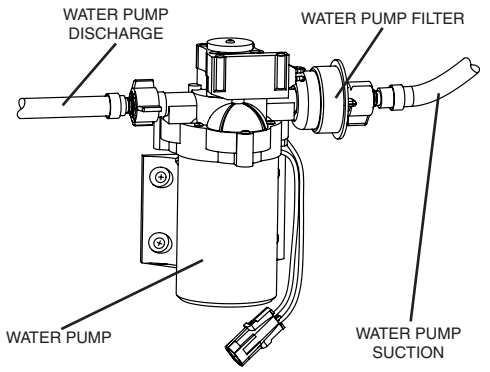
Your water system is now sanitized.

B. Water Pump and Filter

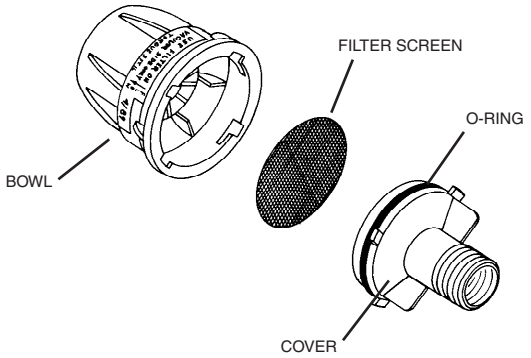
The water pump and filter location differs from model to model, but is typically located near the fresh water tank. The filter prevents particles from entering the pump head. The filter should be checked and cleaned once a season or when flow is restricted.

Before servicing the system, turn the WATER PUMP switch OFF and open a faucet to release pressure on the system. To clean the filter, remove the screen and rinse with clean water. Replace, making sure the O-ring is in place when replacing the cover.

Water Pump and Filter
(Fig. 7.3.1)



Water Pump Filter
(Fig. 7.3.2)



C. Winterizing the Water System

For winterizing the water system refer to Section 8, Winterization Checklist For Boats Stored on Land, E. Water System.

D. Shower System

The shower drains into a self-contained shower sump containing a pump and float switch.

The sump pump is fully automatic and is protected by a breaker on the main DC breaker panel. Check the pump and float switch for obstructions and proper working order.

The pump comes on when there is enough water in the sump to raise the float switch and start the pump. If it does not come on after one or two gallons of water drain from the shower, turn the water off and check the pump and float switch for proper operation.

After using the shower, it is recommended that you run a gallon of clean water through the shower drain to clean out soap residue. Check the pump and float switch for obstructions and proper working order.

E. Transom Shower

If installed, the transom shower pullout sprayer is located on the transom. The system uses water from the fresh water tank. The FRESH WATER PUMP breaker must be ON to operate the system.

F. Dockside Water Inlet

The dockside water inlet, located in the transom locker adjacent to the transom spigot, allows use of a dockside water source to provide water for the boat's fresh water system.

To Use the System:

1. Make sure the "FRESH WATER PUMP" breakers are OFF.
2. Remove the plug from the face of the dockside water inlet.
3. Connect a drinking water hose to the water outlet on the dock, then to the dockside water inlet on the boat and turn on the water at the dock.

All fresh water faucets and showers are now usable.

To disconnect the system, reverse the procedure, making sure the plug is reinstalled tightly.

Remove the dockside water hose when leaving the boat. This is a safety precaution to prevent the unlikely event of a water system failure and the intake of extreme amounts of water to the vessel.

⚠ WARNING

- **DO NOT leave boat unattended with the dockside water hose connected.**
- **Dockside water should be connected during periods of heavy water usage only.**

G. Fresh Water Wash Down Spigot

If installed, the fresh water wash down spigot is located in the transom or cockpit side panel. The system uses water from the fresh water tank. The FRESH WATER PUMP breaker on the DC main distribution panel must be ON to operate the system.

H. Water Heater

The water heater is located in the engine room. The water heater is powered by a breaker on the main distribution panel in the cabin.

The water heater has a check valve to prevent hot water from back washing into the cold water source and a pressure relief valve to avoid damage to the heater from over pressure of excessive temperature.

4. Gray Water System

If installed, the gray water system is designed for boats that are used in areas that restrict overboard water discharge.

The system directs waste water from accessories such as the galley and head sinks and shower to the shower sump that is fitted with a float switch and pump that pumps the water to the head system holding tank. The tank must be emptied when it becomes full.

To empty the head/gray water system holding tank, the services of a dockside pump out station will be needed.

Follow instructions at the station and make sure pump out station hose is inserted into the deck plate marked WASTE.

5. Head System

The typical head system in Sea Ray® Sport Yachts includes a holding tank with dockside pumpout and fluid indicators, with a macerator and overboard discharge seacock available as an opotion. You should be aware of whether your boat is equipped with the optional overboard discharge system and read the section pertaining to it. The Owner's Manual Package has specific information on the system installed in your boat. Read that material.

A. Requirements for Operators

NOTICE

There is a possibility of being fined for having an operable direct overboard discharge in some waters. Close waste discharge seacock and remove handle or take other measures to avoid fine.

The Environmental Protection Agency (EPA) standards state that in freshwater lakes, freshwater reservoirs or other freshwater impoundments whose inlets or outlets are such as to prevent the ingress or egress by vessel traffic subject to this regulation, or in rivers not capable of navigation by interstate vessel traffic subject to this regulation, marine sanitation devices certified by the U.S. Coast Guard installed on all vessels shall be designed and operated to prevent the overboard discharge of sewage, treated or untreated, or of any waste derived from sewage. The EPA standards further state that this shall not be construed to prohibit the carriage of Coast Guard-certified flow-through treatment devices which have been secured so as to prevent such discharges. They also state that waters where a Coast Guard certified marine sanitation device permitting discharge is allowed include coastal waters and estuaries, the Great Lakes and interconnecting waterways, freshwater lakes and impoundments accessible through locks, and other flowing waters that are navigable interstate by vessels subject to this regulation (40 CFR 140.3).

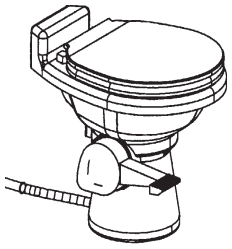
⚠ CAUTION

Do not flush facial tissue, paper towels or sanitary napkins in head. Such material can damage waste disposal system and the environment.

B. VacuFlush® Head

The VacuFlush® head utilizes a HEAD SYSTEM breaker on the main distribution panel. The foot pedal at the base of the toilet opens a mechanical seal and vacuum forces waste through the opening in the bowl to an accumulator tank, through the vacuum pump and then to the holding tank or treatment tank. To Operate:

VacuFlush® Head (Fig. 7.5.1)



1. Turn ON the WATER PUMP breaker.
2. Turn ON the HEAD SYSTEM breaker.

REFER TO OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

C. Holding Tank Operation

Waste from the head is directed into the holding tank located behind the block-off in the aft end of the ski locker. The holding tank fluid level indicator is located on the main distribution panel or in the head which indicates 3/4 FULL, FULL and DO NOT FLUSH, or on some models may read FULL, 1/2, or EMPTY. When the FULL light is on, the DO NOT FLUSH light will also be on. When these lights are ON, the holding tank must be emptied before the head can be reused.

Dockside Pump-out

To empty holding tank, the services of a dockside pump out station will be needed. Follow instructions at the station and make sure pump out station hose is inserted into the deck plate marked WASTE. The holding tank can also be emptied through utilization of the macerator (if supplied) (see Macerator in this section).

D. Vent Filter

The vent filter is designed to control odors associated with the head system operations. The vent filter is located on the holding tank. **The filter must be changed at the beginning of each boating season to be effective.** The vent filter is installed in-line on the holding tank ventilation hose.

Note: Do not over fill the holding tank as this will flood the vent filter and render it useless. Filter replacement will then be required. See Parts Manual for correct replacement filter.

6. MACERATOR DISCHARGE PUMP WITH SEACOCK INTERLOCK SYSTEM

NOTICE

There is a possibility of being fined for having an operable direct overboard discharge in some waters. Close waste discharge seacock and remove handle or take other measures to avoid fine.

If equipped, the optional macerator gives the boat operator the means of discharging the holding tank contents directly overboard through a seacock in the bottom of the hull. This is available in conjunction with the dockside pump out.

Since direct overboard discharge is prohibited in many areas, the macerator seacock is normally closed. The macerator seacock is equipped with a system interlock switch which prevents the operation of the macerator when the macerator seacock is closed. The light on the DISCHARGE PUMP switch on the DC Distribution Panel will be lighted when the macerator is operational. If the light is not lighted, it is visual confirmation the macerator seacock is closed and that the macerator cannot be operated. Check that the macerator seacock handle is in the open position and the light on the switch is lighted before operating the macerator.

TO OPERATE THE MACERATOR:

1. Turn ON the DISCHARGE PUMP breaker on the salon DC distribution panel and open the waste discharge seacock located on the bilge floor (See Fig. 4.10.1 - 4.12.1) for seacock location).
2. Operate DISCHARGE switch at the WASTE SYSTEM CONTROL area on the main distribution panel.
3. When tank is empty, turn the switch to OFF and close waste discharge seacock.

NOTE: Turn OFF discharge pump to prevent accidental discharge.

MAINTENANCE

Prior to each use and at regularly scheduled intervals, cycle the macerator seacock handle open and shut to ensure proper operation of the seacock

7. AUTOMATIC FIRE EXTINGUISHER SYSTEM

AUTOMATIC FIRE EXTINGUISHER (FIG. 7.6.1)

Your boat may be equipped with an automatic fire extinguisher system located aft of the engine. In the event of a fire, the heat sensitive automatic head will release the extinguishant as a vapor, totally flooding the area in fire-killing concentrations.

IF ACTUATION OCCURS, IMMEDIATELY SHUT DOWN ALL ENGINES, POWERED VENTILATION, ELECTRICAL SYSTEMS AND EXTINGUISH ALL SMOKING MATERIALS. DO NOT IMMEDIATELY OPEN THE ENGINE COMPARTMENT!! THIS FEEDS OXYGEN TO THE FIRE AND FLASHBACK COULD OCCUR.

AUTOMATIC FIRE EXTINGUISHER INDICATOR LIGHT (FIG. 7.6.2)

AUTOMATIC EXTINGUISHER SYSTEM

1. **LIGHT ON-UNIT CHARGED**
2. **LIGHT OFF-UNIT DISCHARGED**
3. **IF SYSTEM DISCHARGES. SHUT DOWN ENGINE(S), BLOWERS AND ELECTRICAL SYSTEMS**

Allow the exinguishant to “soak” the compartment for at least fifteen (15) minutes and for hot metals or fuels to cool before cautiously inspecting for cause of fire. Have portable extinguishers at hand and ready. Do not breathe fumes or vapors caused by the fire.

A. Gasoline Engine Boats

The system indicator light is wired to the ignition and is turned ON when the ignition is turned ON. The indicator light, located on the control station starboard panel, indicates to the helmsman when the unit has discharged. Under normal circumstances, when the ignition is ON the charge indicator light is ON. If the unit discharges, the light will go OFF.

B. Diesel Engine Boats

Automatic Fire Extinguisher Indicator Light (Diesel Engine)
(Fig. 7.7.1)

The system indicator and switch module (ENGINE SHUTDOWN AND OVERRIDE SYSTEM) operates similarly to the indicator light for the gas engine boats. The module also incorporates an engine shutdown switch with override system. When the system discharges it will shutdown the engine.

C. Manual Fire Extinguishing System Pull Handle

Located at the helm, the manual fire extinguisher system allows the operator to manually activate the automatic extinguisher in the engine room. Early detection and use of the manual override system will reduce fire damage by eliminating the time necessary for heat in the engine room to rise to a temperature necessary to activate the automatic fire extinguisher.

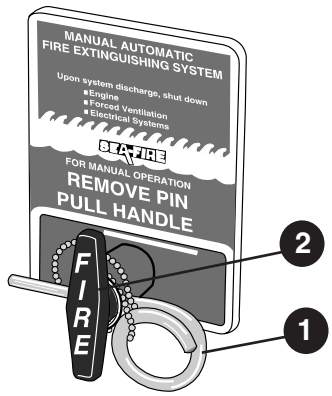
To Operate:

1. Pull pin securing the handle.
2. Pull red FIRE handle quickly and briskly.

Manual Fire Extinguishing System
Pull Handle (Fig. 7.7.2)

TO MANUALLY ACTIVATE THE ENGINE ROOM FIRE EXTINGUISHER:

1. PULL PIN
2. PULL HANDLE

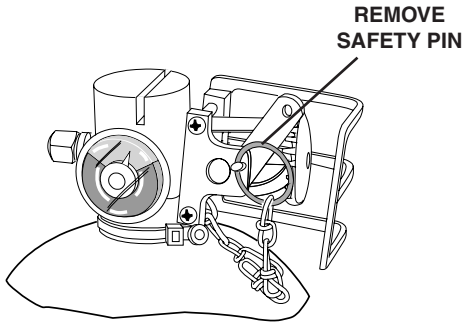


located at the helm

D. Safety Pin

The safety pin is used on boats equipped with the Manual Fire Extinguishing System Pull Handle. The safety pin, located at the neck of the extinguisher bottle in the engine room is for shipping and transfer of the bottle only. The pin MUST be removed in order to manually operate the system.

Engine Room Fire Extinguisher
(Fig. 7.7.3)

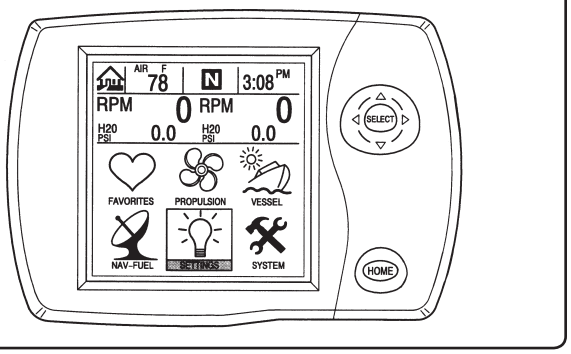


NOTE: THE MANUAL SYSTEM WILL NOT OPERATE IF SAFETY PIN IS INSTALLED.

8. SMARTCRAFT™

The Smartcraft System, located at the helm, provides a comprehensive boat information center. This system allows the boat operator to monitor a wealth of critical operational information which is displayed clearly and instantly at the helm on the LCD display.

SMARTCRAFT SYSTEM (OPTIONAL)
(FIG. 7.8.1)



The system monitors water temperature and depth, engine trim, boat speed, steering angle, system preventive maintenance reminders, and systems diagnostics. In addition the system can be integrated with the boat's GPS, if equipped, to provide up to the minute course, speed, and fuel-to-destination information.

NOTE: The detailed information listed which is standard on some models may be optional on others, or may not be available on some models based on engine and system configurations.

Refer to the SmartCraft™ System View owner's manual in the owner's package for all SmartCraft™ operating instructions.

SYSTEM CALIBRATION (FOR FIRST TIME USE)

Before using SmartCraft™ System View for the first time the system must be calibrated.

If this has not been done by your dealer refer to the System Calibration section of the SmartCraftTM System View Owner's Manual.

9. BOW THRUSTER

If equipped, the Bow Thruster located under an access panel in the floor of the forward stateroom is electrically driven and gives the operator more maneuverability of the bow. The Bow Thruster battery switch and control panel are located on the control station.

For more information regarding the operation of the optional bow thruster see Section 3 - Using Your Boat.

REFER TO OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

10. REFRIGERATOR & FREEZER

The refrigerator/freezer unit is located in the galley. The unit is supplied power by the REFRIGERATOR/ FREEZER breaker on the salon 120 volt AC main distribution panel. To operate dockside, connect the shore power system, turn the MAIN breaker(s) ON. Then turn the REFRIGERATOR/FREEZER breaker on the AC main distribution panel ON.

⚠ CAUTION

Do not cover refrigerator/freezer vents.

COCKPIT ICE MAKER

If equipped, the cockpit ice maker is located in the cockpit wet bar. To operate, turn ON the REFRIGERATOR/FREEZER breaker on the salon 12 volt DC distribution panel.

TO START ICE MAKER:

1. Make sure water tank is full.
2. Turn "FRESH WATER PUMP" breaker ON.
3. Turn ON ice maker switch, located at the bottom of the unit. Allow unit to cycle several times before using ice. Refer to water system for more information.

REFER TO OWNER'S Manual PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION

11. COFFEE MAKER

The drip coffee maker located in the galley cabinet is a completely portable unit which can be moved around the vessel wherever fresh brewed coffee is desired. It operates on the 120 volt system.

⚠ CAUTION

Turn off coffee maker before closing cabinet doors. Failure to do so may result in damage to the coffee maker or cabinet.

To keep the coffee maker operating efficiently, the mineral deposits left by water must be flushed out using the cleaning method described in the instruction booklet.

REFER TO OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

12. STOVE & MICROWAVE

A. ELECTRIC STOVE

The 120 volt STOVE breaker on the AC main distribution panel supplies power to the stove and must be ON to operate the stove.

The stove has two (2) burners with control knobs to provide a variation of heat.

REFER TO OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

B. MICROWAVE/CONVECTION OVEN

The microwave/convection oven is located in the aft upper cabinet in the galley. The MICROWAVE breaker on the AC main distribution panel supplies power to the microwave and must be ON to operate the unit.

NOTE: Turn on the galley power ventilation system when operating the convection oven.

REFER TO OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

13. POWER VENTILATION SYSTEM

The power ventilation system removes stagnant & foul air from the master stateroom head, guest head and galley by means of 12 volt exhaust fans. They are powered by the power vents breaker on the salon DC distribution panel and individually turned on and off by the power vent switch in the heads and the galley.

14. SPOTLIGHT

The spotlight is mounted on the bow.

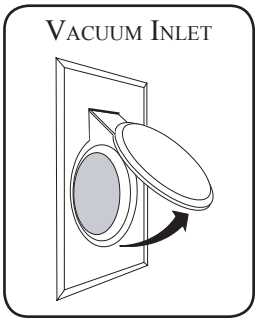
TO OPERATE THE SPOTLIGHT:

1. Turn ON the "SPOTLIGHT" breaker on the control station switch panel.
2. Press the POWER button on the spotlight pad to turn on the spotlight.
3. Press SPEED button to adjust the movement speed of the spotlight.

REFER TO OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

15. CENTRAL VACUUM SYSTEM

The central vacuum unit is typically located under the salon sofa. The 120 volt STBD SYSTEMS breaker must be ON to operate the system.



The 24 foot hose stored in the salon floor storage connects to an inlet typically located in the step up leading from the mid stateroom to the salon.

The disposable bag is located behind the removable panel on the top of the vacuum unit. The built in switch on the hose inlet fittings activate the vacuum when the hose is plugged in.

REFER TO OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

16. CANVAS

⚠ DANGER

If the cockpit is totally enclosed with canvas covers and curtains while the engine is running or boat is moving, carbon monoxide will build up and cause death or permanent injury.

Do not use the rear (aft) curtain while engine is running or boat is moving.

If included, the Bimini Top or sunshade should not be used when the vessel speed exceeds 45 MPH. Damage to the boat or Bimini may occur.

Attached to the inside of the Bimini Top is a DANGER tag for Carbon Monoxide Gas (CO) buildup and a WARNING tag for limiting speeds when Bimini Top canvas is installed. The rear (aft) curtain also has a WARNING tag stating "The Aft Curtain must not be used while engine is running or boat is underway". If your canvas does not have these tags, they become lost or are unable to be read, contact your dealer for replacement labels.

For your safety, decide which canvas pieces you want to remove or install before you leave the boat slip or off-load your boat from the trailer into the water. Removing or installing canvas on the water can be difficult since rough water or wakes can cause you or your passengers to lose their balance while attempting canvas removal or installation.

⚠ DANGER

Exhaust fumes from engines contain deadly carbon monoxide gas (CO). Boats enclosed with canvas or with poor ventilation are most likely to collect fumes.

CO sickness symptoms include headache, nausea and dizziness. Do not mistake these symptoms for sea sickness.

Ventilate boat. See Section 1.4, Carbon Monoxide, for more details.

For safety and ease of installation and removal of canvas, use at least two people. Know which canvas piece(s) that you are to install or remove.

Each model has different standard and optional canvas packages and pieces. Refer to the Specific Information Manual for your model or your Authorized Sea Ray Dealer for information on what options are available for your boat.

The typical canvas pieces available are:

- Sunbrella® Bimini Top w/ Boot
- Aft Curtain
- Front Curtains
- Side Curtains
- Canvas Storage Bag
- Cockpit Cover w/ Tonneau

⚠ DANGER

In rainy weather and/or cold weather, fresh air must circulate through boat to avoid carbon monoxide poisoning.

See Section 1.4, Carbon Monoxide, for more details.

A. INSTALLATION TIPS

- Zippers: Zippers are located on each canvas piece. Make sure canvas is centered over the metal canvas support rods (bows). When attaching any canvas piece, zip the zippers only partially. This helps to hold the piece in place and relieves tension, helping the other sides zip or snap easier. After all the sides of the piece are snapped in place, finish zipping all the zippers. This will ensure a tight fit.
- Adjustable Support Rods: Adjustable support rods are located on the Convertible and Bimini Top. There is an outside tube and an inside tube. Push in the button to adjust for longer or shorter rod lengths.

B. CANVAS CARE AND MAINTENANCE

See Section 9, for instructions on the care and maintenance of your canvas.

17. HORN

The horn is operated by a momentary switch on the dash and is protected by a fuse on the accessory fuse block (refer to Specific Information Manual for your model for location of the accessory fuse block).

REFER TO OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

18. UNDERWATER LIGHTS

If installed, the underwater lights are protected by a fuse on the accessory fuse block (refer to Specific Information Manual for your model for location of the accessory fuse block). They are operated by the ACCY switch on the switch panel at the helm.

The underwater lights are designed for use ONLY while the boat is in the water.

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Routine inspection, service and maintenance of your boat's systems are vital to assure your safety, as well as for prolonging the life of your boat. You should develop regular routines for inspecting your boat. The chart below summarizes inspection, service and maintenance activities. This section also contains descriptions of some convenient methods for evaluating the condition of some of your boat's systems.

The interval between necessary service or maintenance is highly variable, depending on the environment your boat is in, and on the severity of operating conditions. For example, corrosion of parts on boats operated in salt water proceeds much faster than the corrosion of parts on a boat operated in fresh water. The intervals listed below are recommended maximums, and you must reduce the time between inspections if your observations indicate the need.

1. SUMMARY GUIDE FOR INSPECTION, SERVICE AND MAINTENANCE

			INTERVAL				
ITEM	**REQUIRED MAINTENANCE/SERVICE**	**REFERENCE SOURCE**	**BEFORE EVERY USE**	**AFTER FIRST 20 HOURS**	**EVERY 25* OR 50 HOURS**	**EVERY 50* OR 100 HOURS**	**EVERY 6 MOS. OR ANNUALLY**
Battery	Check water level	General Manual p. 6.1	•	•	•		
Bilge Area	Clean & check for oil & debris	General Manual p. 4.1	•				•
Bilge Blower	Hose connections & operation	General Manual p. 4.2	•				•
Bilge Pump	Float switch operates freely	General Manual p. 4.1	•				•
Bilge High Water Alarm	Alarm sounds when pump is activated	General Manual p. 4.1	•				•
Canvas	Clean	General Manual p. 9.3	As Needed				
Controls							
Steering	Check for proper operation		To be done by Sea Ray® dealer every six months				
	Power steering oil level	Engine Manual	•				
Gear Shift & Throttle	Lubricate. Include all shift linkage and pivot points	Engine Manual		•		•	•
Electrical							
Connections	Clean and tight		To be done by Sea Ray® dealer annually				
GFCI (AC) Outlet	Check for operation	General Manual p. 6.5					•
CO Monitor	Check for operation	Systems Manual	Refer to System manual for recommended schedule				
Engine							
Alarm	Check	Engine Manual	•				
Cooling System Connections	Check for leaks with engine running	Engine Manual	•				
Crankcase ventilating system	Clean	Engine Manual		•		•	
Alignment	Check	Engine Manual				•	•
Drive belts	Check	Engine Manual	•				
Exhaust System	Check for leaks	Engine Manual	•	•		•	
Flame Arrestor	Clean	Engine Manual		•		•	
Fuel Filter	Replace	Engine Manual				•	
Mounts (Fasteners)	Tighten	Engine Manual		•			•
Oil and Filter	Replace	Engine Manual				•	•
Engine Oil	Check Level	Engine Manual	•				
Drive Oil Reservoir	Check Level	Engine Manual	•				
Seacocks	Check for functionality	General Manual p.4.8					•
Shaft & Rudder	Check alignment & seals	Engine Manual	Refer to engine manual for recommended schedule				

*Use in salt water or other severe operating conditions requires shorter maintenance/service intervals

SUMMARY GUIDE FOR INSPECTION, SERVICE AND MAINTENANCE

			INTERVAL				
ITEM	**REQUIRED MAINTENANCE/SERVICE**	**REFERENCE SOURCE**	**BEFORE EVERY USE**	**AFTER FIRST 20 HOURS**	**EVERY 25* OR 50 HOURS**	**EVERY 50* OR 100 HOURS**	**EVERY 6 MOS. OR ANNUALLY**
Stern Drive (With Stern Drive Engine Option)							
Fluid level	Check level	Engine Manual	•				
Fluid	Replace	Engine Manual					•
Trim Pump Fluid	Check Level	Engine Manual	•				
Zeus Drive Engines							
Power Package componants	Treat with Corrision Guard	Engine Manual	Every 2 months of operation				
Transmission Fluid and Filter	Change			•			•
Fuel System							
Connections & Lines	Check for leaks	Engine Manual	•	•	•		
Tank	Check for leaks	Owner's Manual p. 5.1	•	•	•		
Water Separating Fuel Filter	Replace	Engine Manual		•			•
Sliding Seats and Ladder							
Helm Seat of spray lubricant	Spray slider with light coating				•		
Transom Swim Ladder	Spray slider with light coating of spray lubricant				•		
Propeller	Inspect for damage		Always after striking object				
Seaworthiness							
Bilge drain plug	Installed and tight	Owner's Manual p. 4.1	•				
Hull damage Stern drive	Check for loose, damaged or missing parts		Before every use and always after striking object				
Topside & Supplies or missing parts	Check for loose, damaged	Owner's Manual p. 8.5					•
Anchor line	Check line for wear						•
Transmission							
Oil Strainer Screen	Clean		To be done by Sea Ray® dealer annually				
Trim Tabs							
Fluid	Check and add as needed	Trim Tab Manual		•			
Zincs							
Transom Zinc	Check and replace as needed	Owner's Manual p. 6.7	Every 25 hours of operation or monthly				
Trim Tabs	Check and replace as needed	Trim Tab Manual	Every 25 hours of operation or monthly				

*Use in salt water or other severe operating conditions requires shorter maintenance/service intervals

2. USEFUL SERVICE INFORMATION

OWNER _____

HOME PORT _____

BOAT NAME _____

REGISTRATION NUMBER _____ STATE _____

HULL SERIAL NUMBER _____

WARRANTY REGISTRATION DATE _____

ENGINE MAKE & MODEL _____

SERIAL NUMBER _____

PART NUMBER _____

FUEL CAPACITY _____

WATER CAPACITY _____

KEY NUMBER, IGNITION _____ DOOR _____

SELLING DEALER _____

CITY & STATE _____

LENGTH _____ BEAM _____ DRAFT _____

VERTICAL CLEARANCE _____

ESTIMATED WEIGHT _____

GENERATOR SERIAL # _____ MODEL # _____ KILOWATTS _____

3. Inspection, Service and Maintenance Protocol

A. Bilge Area

Many of your boat's systems have critical features located in the bilge area. A thorough and organized inspection of the bilge area will address many of these critical features. For example, engine oil leaks and fuel system leaks will show themselves as contamination on the surface of the liquid that remains in the bilge. When you see such contamination, you should look for its source.

Once or twice a year, pump the bilge areas dry and remove all loose dirt. Be sure that all the limber holes are open. Limber holes are the openings in the stringers that allow water to flow from the outboard areas of the bilge to the bilge sump.

Check the bilge pump float switch by moving it manually. The bilge pump should start when the float switch is raised and should stop when lowered. If it does not, first try resetting the bilge pump breakers, if the pump will still not run replace the float switch before using your boat. The float switch should also move freely without sticking, if it does not, have it serviced or replaced before boating.

⚠ WARNING

DO NOT USE FLAMMABLE SOLVENTS to clean any part of the bilge.

Fumes can accumulate and can be the source of an explosion.

1. Oil

If there is oil contamination, look for leaks in engine oil lines and engine gaskets. If parts of the bilge have been stained by oil, the stain can be removed using a bilge cleaner available from your dealer or a marine store.

2. Engine

Engine failure or malfunction, when away from shore, can be dangerous. Make certain you do the following each time you use the boat:

- Wipe off the engine to remove accumulated dust, grease and oil.
- Check all exposed nuts, bolts and screws for tightness.
- Inspect the belts for wear. If they do not require replacement, check and adjust the belt tension according to the engine manufacturer's recommendation.
- Inspect engine wiring, and clean and tighten the terminals on the engine electrical system.
- Clean and lubricate the battery cables.
- Add distilled water to the battery cells as needed.
- Refer to your Engine Operator's Manual for additional engine maintenance requirements.

3. Fuel System

- Inspect the entire fuel system for evidence of leakage, including the fuel tank fill lines and vents. Any stain around a joint could be an indication of a leak.
- Test all fittings with a wrench to be sure they are not loose, but do not forcefully overtighten the fittings.
- Clean fuel filters and vent screens.

⚠ WARNING

Work on electrical wiring can create shock hazards or sparks.

Always shut off battery switch, breakers and/or pull fuses before checking electrical wiring or connectors.

4. WIRING SYSTEM

- Check all wiring for proper support.
- Check all wiring insulation for signs of fraying or chafing.
- Check all terminals for corrosion - corroded terminals and connectors should be replaced or thoroughly cleaned.
- Tighten all terminals securely and spray them with light marine preservative oil.

5. FITTINGS, HOSES AND CLAMPS

- Inspect the entire bilge area for evidence of damage or deterioration. Evidence of deterioration will first appear around hull fittings, hoses and clamps.
- Straighten kinked hoses.
- Replace any hose that does not feel pliable.
- Check all hose clamps for tightness and corrosion. Corroded clamps must be replaced.
- Check the nuts, bolts and screws that retain equipment, hoses, etc. in the bilge for tightness and corrosion. Corroded fasteners must be replaced.

B. TOPSIDE AND SUPPLIES

Once a year, you should undertake a thorough review of the topside equipment, as well as of the critical safety supplies on your boat.

- Check cleats, rings, rails, etc. for loose or corroded fasteners, breaks, sharp edges or other conditions that could lead to malfunction or unsafe use. Repair or replace as necessary.
- Inspect PFDs (life jackets) for tears and deterioration.
- Make certain you have enough PFDs on board for the maximum number of persons you can carry.
- Check your first aid kit, making certain it is complete and that the items in it have not passed an expiration date.
- Check the signaling equipment and emergency flares. Make sure all items are within their expiration dates.
- Inspect the anchor, mooring and towing lines. Repair or replace as required.
- Check fire extinguishers for full charge.

4. WINTERIZATION CHECKLIST FOR BOATS STORED ON LAND

A. BOAT STORAGE

- Store boat in a bow high attitude.
- Remove hull drain plug.
- Pour one (1) pint (half-liter) of 50% water/ antifreeze mixture in each bilge pump sump.

B. ENGINES

- Flush engines with fresh water.
- Remove engine drain plugs.

REFER TO YOUR ENGINE OPERATOR'S MANUAL FOR DETAILED INFORMATION ON PREPARING THE ENGINES FOR STORAGE AND WINTERIZATION.

C. BATTERY(IES)

- Remove from boat. Remove the negative (-) cable first, then the positive (+) cable.
- Remove grease and dirt from top surface.
- Grease terminal bolts.
- Store on wooden pallet or thick plastic in a cool dry place. Do not store on concrete.

- Keep under a trickle charge.
- When placing battery back into service, remove excess grease from terminals, recharge as necessary and reinstall in boat.

D. Head System

- Flush entire system thoroughly with fresh water.
- Pump out holding tank.
- Remove water line from inlet fitting located on back bottom half of water valve on head.
- Flush one (1) gallon (four liters) antifreeze mixed with one gallon (four liters) of water through toilet and let vacuum pump run for one or two minutes.
- Shut FRESH WATER PUMP breaker OFF.
- Pump out holding tank.

E. Water System

- Turn ON the FRESH WATER PUMP breaker.
- Open water faucet, let system drain completely.
- Turn OFF the FRESH WATER PUMP breaker.
- Water must be removed from the water lines with air pressure or flushed with a nontoxic antifreeze.

Using pressurized air to remove water from water lines:

- You must have an air compressor with air hose and air nozzle.
- Remove water hoses from water pump.
- Alternate opening one faucet at a time to make sure water is removed from each line.
- Blow air through the water lines removed from the water pump.

NOTE: When blowing air be careful not to blow air with all faucets closed. System could be damaged by over pressurization and create water leaks.

- Cover hose ends with screen or broad weave cloth and tape in place to keep out dirt and bugs.

Using nontoxic winterizing antifreeze:

- Purchase a nontoxic winterizing antifreeze for fresh water systems from a marine or RV supply retailer.
- With all water pumped out of the system add nontoxic antifreeze to the water tank. Pour in enough to be pumped to all faucets and showers.
- Close all faucets and turn on water system.
- Open one faucet at a time. Close faucet when nontoxic antifreeze comes out of faucet.
- After all faucets and showers have been treated, open all faucets and pump out remaining nontoxic antifreeze.

Water Heater Winterization

- Refer to your water heater Owner's Manual for detailed information on preparing water heater for storage and winterization.

F. Fuel System

Gasoline:

- Fill fuel tank with gasoline and the recommended amount of stabilizer and conditioner such as "Stabil®".
- Run engine(s) for ten minutes to ensure that all gasoline in the carburetor and fuel lines are treated.

DIESEL:

- Fill fuel tank with diesel and recommended amount of biocide, "Biobor®", which prevents bacteria and fungi from contaminating diesel fuel that contains some water.
- Diesel fuel should also get a petroleum distillate additive, such as "Stabil®" or Racor® RX100". This will absorb water in the fuel and prevent freezing problems.
- Run engine(s) for ten minutes to ensure that all diesel fuel in injectors and fuel lines is treated.

DETAILED WINTERIZING, OPERATING INSTRUCTIONS AND WARRANTY INFORMATION ARE PROVIDED BY THE EQUIPMENT MANUFACTURER AND CAN BE FOUND IN THE OWNER'S PACKAGE.

⚠ CAUTION

Do not overfill. Filling a tank until the fuel flows from vents is dangerous. Allow room for expansion.

5. FITTING OUT AFTER STORAGE

A. FUEL SYSTEM

Check the entire fuel system for loose connections, worn hoses, leaks, etc. and repair. This is a primary safety precaution.

Check fuel lines for damage and make sure that they do not come in contact with any moving parts.

B. BATTERY(IES)

Before installing the batteries, clean the terminal posts with a wire brush or steel wool and then attach the cables. After the cable clamps are tightened, smear the post and clamps with vaseline or grease to exclude air and acid. Do not apply grease before attaching and tightening the terminal clamps. Examine all wiring.

C. MISCELLANEOUS

- Check all thru-hull fittings for unobstructed water passage. Be alert for any deteriorated hoses and/or fittings below the water line which might fail in service and admit water.
- Test the navigation lights.
- Check all wiring for loose connections.
- Check all switches and equipment for proper operation.
- Check bilge blowers for proper operation. Turn ON blowers and place hand over hull blower vent to make sure air is coming from vent.
- Anchor lines and gear should be inspected and replaced if necessary.
- Make sure the hull drain plug is in place and tight.
- Clean bilge thoroughly if it was not done at lay-up.
- Check all engine fluid levels.
- Check fuel lines for damage and/or leaks. Make sure that they do not come into contact with moving parts.

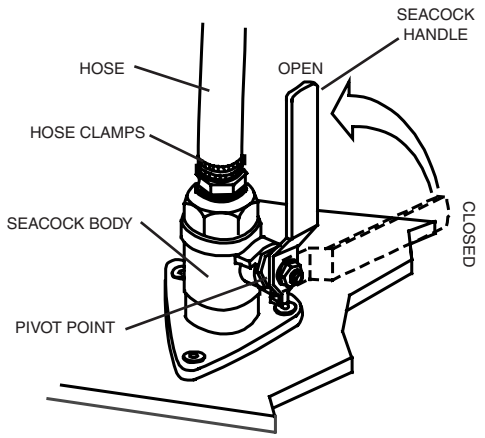
6. SECURITY CONSIDERATIONS

Be conscious of the security of your boat. Always remove the keys from the ignition, lock hatches, lock the cabin door, remove and stow any removable electronic gear (fish finders, GPS, etc.) and personal gear (fishing poles, etc.) normally left aboard your boat.

7. SEACOCK LUBRICATION

- With boat out of water, remove the hose from top of the seacock.
- Put seacock handle in closed position.
- Add a few drops of lubricating oil inside.
- Work handle back and forth a few times. Add oil as needed.
- Replace hose and tighten clamp.
- Add a few drops of oil to the handle pivot point.

SEACOCK
(FIG. 8.8.1)



8. QUICK REFERENCE CHECKLIST

As the owner/operator of a Sea Ray® boat, you are responsible for the safe operation of your boat and the safety of your passengers. Always be sure that required documents, navigational equipment and Coast Guard required safety equipment is aboard and in proper working order.

A. BOARDING THE BOAT*

GENERAL

1.	Weather Conditions	Is it going to be safe to go out
2.	Transom Drain Plug	Installed
3.	PFDs and all other Coast Guard required safety equipment	Available for all children and adults
4.	Ignition keys	Available
5.	Tool Box	Stocked with a variety of appropriate tools

BOAT SYSTEMS

1.	Bilge Pumps	Working. Discharge any appreciable amounts of water overboard
2.	Blowers	Working. “Sniff” the bilge/engine compartment for fuel odor
3.	Navigation Lights	Working. Have spare bulbs (and if applicable fuses) aboard
4.	Radio/Electronics	Working
5.	Horn	Working
6.	Trim Tabs	Full range of motion. No excessive play or binding
7.	Fresh Water Tank	Filled and sanitized
8.	Head System Holding Tank	Empty
9.	Seacocks	Engines & Generator Open (handle parallel to hose), Head System Holding Tank Closed (handle perpendicular to hose)

ENGINE

1.	Batteries	Fully charged (Check water cell levels)
2.	Fuel Tank	Filled with recommended fuel
3.	Fuel System	Check for leaks
4.	Fuel Filters	Check that filters are clean and tight
5.	Diesel Racor Fuel Filters	Check that filters are clean, tight and free of water
6.	Engine Coolant Drain Plug	Secured
7.	Steering Fluid	Full
8.	Throttle & Gearshift Control Test	Full range of motion

***Note:** Many of these items should be checked before leaving the house.

QUICK REFERENCE CHECKLIST (CONT'D)

B. PREPARING TO DEPART AND AFTER LAUNCHING

GENERAL

1. Bilge/Engine Compartment ..... "Sniff" the bilge/engine compartment for fuel odor. Run the bilge blowers for at least four (4) minutes.
2. Shore Power Cable..... Disconnected from dockside power inlet
3. Lines, Fenders and Anchor..... Ready for use
4. Passengers/Crew ..... Instructed in duties for getting underway and fitted for a correct size PFD

ENGINE

1. Battery Switches..... In the ON position
2. Fuel Valves (Diesel Only)..... Open
3. Engine Alarm..... Test. Should sound after a few seconds
4. Gear Shift & Throttle Control ..... In NEUTRAL and IDLE positions

STARTING THE ENGINE*

1. Gearshift & Throttle Control..... Shift in NEUTRAL (Refer to your Engine Owner's Manual for start-up procedures for your specific engine)
2. Ignition ..... Turn master ignition keys on DC distribution panel to the ON position. Depress ignition switch on the helm switch panel to START position until engine starts, then release to RUN position (light on).

IMPORTANT: Do not continue to operate starter for more than ten (10) seconds without pausing to allow starter motor to cool off for two (2) minutes. This also will allow the battery to recover between starting attempts.*

⚠ WARNING

Do not run the engine or generator in an enclosed area, such as a closed boat house, as there is the possibility of buildup and inhalation of carbon monoxide.

*If engine fails to start, refer to the Engine Owner's Manual for further troubleshooting procedures

QUICK REFERENCE CHECKLIST (CONT'D)

C. WHILE UNDERWAY

GENERAL

1.	Passengers/Crew	Safely seated with PFDs on or immediately accessible
2.	Lines, Fenders and Anchor	Stowed

BOAT SYSTEMS

1.	Trim Tabs	Bring boat to "On Plane". Adjust as necessary
2.	Navigation Lights	On at night or in reduced visibility

ENGINE

1.	Tachometer	Engines operating in safe RPM range
2.	Engine Gauges	Continually monitor
3.	Engine Operation	Check idle and shift. Listen for abnormal noises and visually check the engine compartment while underway

D. RETURNING TO PORT

GENERAL

1.	Passengers/Crew	Instructed in duties for line handling
2.	Lines and Fenders	Ready for use

BOAT SYSTEMS

1.	Navigation Lights	Turned OFF when secured
2.	Anchor Light	ON if necessary
3.	Bilge/Engine Compartment	"Sniff" the bilge/engine compartment for fuel odor. Run the bilge blowers if necessary. Check for water in bilge. Run bilge pumps if necessary

ENGINE

1.	Throttle & Gearshift Control	Bring to IDLE and NEUTRAL positions
2.	Tachometer	Idle the engines for five (5) minutes to cool down

QUICK REFERENCE CHECKLIST (CONT'D)

3. Ignition ..... Depress ENGINE STOP switches on the helm switch panel when engines are cooled down.
4. Engine Operation..... Check idle and shift. Listen for abnormal noises

E. SECURING THE BOAT

GENERAL

1. Lines and Fenders..... Fenders in place, lines tied securely to dock
2. Shore Power Cable..... Connected to dockside power inlet

BOAT SYSTEMS

1. Seacocks ..... Closed (handle perpendicular to hose)
2. Helm Switch Panel..... All switches in the OFF position
3. Gearshift & Throttle Control ..... In the NEUTRAL and IDLE positions

ENGINE

1. Ignition ..... Switched in the OFF position (lights off) and master ignition keys removed from DC distribution panel
2. Battery Switch ..... In the OFF position
1. Fuel Valves (Diesel Only)..... Closed (handle perpendicular to hose)

F. IF THE ENGINE DOES NOT START

NO STARTER MOTOR RESPONSE

1. Check gearshift control lever in the NEUTRAL position
2. Check battery condition for sufficient charge
3. Check battery cable connections tight and free from corrosion
4. Check battery switch in the ON position
5. Check starter motor and solenoid connections
6. Check ignition switch connections

STARTER MOTOR RESPONDS, BUT NO IGNITION

1. Check that fuel tanks are not empty
2. Check fuel filters and filter/water separators are clean
3. Check electrical connections on engine wiring harness and ignition wiring

9. AFTER MARKET EQUIPMENT CHECKLIST

Any safety or operational equipment added to your boat after delivery should be checked for seaworthiness and proper working condition. Use the area below to list any equipment and the proper operating condition of that equipment before getting underway.

Equipment	Proper Operating Condition

10. MAINTENANCE LOG

Follow the recommended maintenance listed on pages 1 & 2 of this section and keep a record of this and ALL maintenance performed on your boat. You might want to copy these pages before using them to have blank ones available when these are full.

Date	Maintenance Description	Engine Hours

Section 9 • Care & Refinishing

Your new boat has been designed to provide you with years of enjoyment and satisfaction. In order to maintain the factory new appearance of your boat, we recommend the use of 3M™ Marine's one step Maintenance and Reconditioning Products designed specifically for pleasure boats. Following proper fiberglass maintenance guidelines will help maintain your boat's performance, value, and enjoyment.

1. Paint Cleaning Agents and Other Substances

⚠ WARNING

EXPLOSION/FIRE HAZARD

Care and refinishing materials may contain ingredients that are flammable or explosive. Do not use such materials in the bilge

Shut off electrical power and ventilate when using such materials anywhere on the boat or in the cabin.

Do not create sparks or use lighted materials.

Do not use products containing chlorine, phosphates, perfumes and nondegradable ingredients. Consult your marine dealer regarding environmental regulations before painting the hull. Fumes can last for hours, and chemical ingredients can harm people, property and the environment. Common household cleaning agents may cause hazardous reactions. Read and understand directions on all paint, cleaning and polishing materials before using.

2. Fiberglass and Gelcoat

The fiberglass hull, deck and some interior parts consist of a molded shell and exterior gelcoat. The gelcoat is the outer surface, often colored, that presents the shiny smooth appearance associated with fiberglass products. This gelcoat surface is painted or taped in some areas for styling purposes.

Wash the gelcoat and fiberglass regularly with clean, fresh water. Wax gelcoated surfaces to maintain the luster.

In northern climates, a waxing at the start and end of the boating season may suffice. In southern climates, an application of wax every three months will be required for adequate protection.

REFER TO THE OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

⚠ WARNING

Gelcoat surfaces are slippery when wet.

Always wear nonslip footwear securely fastened to your feet and hold on to rails or the boat structure.

⚠ WARNING

Waxed surfaces are slippery.

Do not wax areas that are usually walked on.

Keep Bilge Area Dry

Water may accumulate in the engine room where it is not able to drain to the bilge pump. Check all areas of the engine room for accumulated water and dry thoroughly. Water left standing may penetrate through the gelcoated surfaces and wick into the fiberglass affecting the life of the product.

3. Stains and Scratches

Although gelcoat and painted surfaces are resistant to deep stains, a need for cleaning will occasionally arise. But, the use of some common cleaning agents will permanently discolor or otherwise damage the finish on your boat.

- Do not use abrasive porcelain-cleaning powders. These are too abrasive and contain chlorine and ammonia, either of which will permanently discolor gelcoat and paint.
- Never use nail polish remover (acetone) or any ketone solvents.
- Use diluted household detergents to remove surface soil and stains. Before using a given brand, check to make sure it contains no chlorine or ammonia.

- Alcohol can be used to remove difficult stains. But it must be promptly washed off with mild detergent and water.
- Minor scratches and deeper stains that do not penetrate the gelcoat may be removed by light sanding and buffing.

4. Permanently Moored or Docked Boats

If permanently moored in salt water or fresh water, your boat will collect marine growth on its bottom. This will detract from the boat's beauty and greatly affect its performance. There are two methods of preventing this:

- Periodically haul the boat out of the water and scrub the bottom with a bristle brush and a solution of soap and water.
- Paint the hull below the waterline with a good grade of antifouling paint. **DO NOT paint the engine drive surfaces**.

NOTE: There are EPA regulations regarding bottom paint application. Consult your Sea Ray® dealer for proper application methods.

5. Care for Bottom Paint

From time to time a slight algae or slime forms on all vessels. The bottom painted portion of the hull can be wiped off with a coarse Turkish towel or a piece of old rug while the boat is in the water. Do not use a stiff or abrasive material to clean the bottom paint.

The bottom paint should be inspected annually. If it needs repainting consult your Sea Ray® dealer.

6. Topside Areas

A. Stainless Steel and Alloy Fittings

Stainless steel and alloy fittings should be cleaned with soap and water or household glass cleaner. Remove rust spots as soon as possible with a brass, silver or chrome cleaner. Irreversible pitting will develop under rust that remains for any period of time. Never use an abrasive like sandpaper or steel wool on stainless. These may actually cause rust. To help protect the stainless, we recommend the use of a good car wax.

B. Salt Crystals

When instruments are exposed to a saltwater environment, salt crystals may form on the bezel and the plastic covers. These salt crystals should be removed with a soft, damp cloth; never use abrasives or rough, dirty cloths to wipe plastic parts. Mild household detergents or plastic cleaners can be used to keep the instruments bright and clean.

REFER TO THE OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

7. Gauge and Switch Panels

No special care is needed. Just wipe off with a soft, fresh water damp cloth to remove dust or salt. Dry after with chamois or soft cloth. Use of protective chemicals is not required.

NOTE: Do not use any chemicals to clean or protect gauge lenses.

8. Acrylic Plastic Sheeting (Plastic Glass)

Never use a dry cloth or duster or glass cleaning solutions on acrylic.

To clean acrylic, first flood it with water to wash off as much dirt as possible. Next, use your bare hand, with plenty of water, to feel and dislodge any caked dirt or mud. A soft, grit-free cloth may then be used with a nonabrasive soap or detergent. A soft sponge, kept clean for this purpose, is excellent. Blot dry with a clean damp chamois.

Grease and oil may be removed from acrylic with kerosene, hexane, white (not aviation or ethyl) gasoline or aliphatic naphtha (no aromatic content).

Do not use solvents such as acetone, silicone spray, benzine, carbon tetrachloride, fire

extinguisher fluid, dry cleaning fluid or lacquer thinner on acrylic, since they attack the surface.

Remove fine scratches with fine automotive acrylic rubbing and polishing compounds.

9. Canvas and Clear Vinyl

Do not fold or store any of the canvas pieces while wet. All canvas should be rolled or folded when dry and stored in a clean, dry place. For clear vinyl pieces, the recommended methods for storage are rolling or laying down flat. The clear vinyl should never be folded or creased as cracking will result. To protect the clear vinyl from rubbing against itself while rolled or stored flat, place a piece of very soft, nonabrasive cloth between the pieces. If the surface of the clear vinyl becomes scratched, the canvas manufacturer has provided a canvas care sheet located in your Owner's Manual Package. When storing the rear (aft) curtain, fold the canvas over the clear vinyl window (do not fold clear vinyl), then roll or store flat.

The fabric should be cleaned regularly before substances such as dirt, pollen, etc. are allowed to accumulate on and become embedded in the fabric. The fabric can be cleaned without being removed from the installation. Simply brush off any loose dirt, particles, etc.; hose down and clean with a mild solution of a natural soap in lukewarm water (no more than 100°F, 38°C); rinse thoroughly to remove soap. DO NOT USE DETERGENTS. Allow to completely dry.

Wash and clean vinyl windows with a warm soap solution. Use a soft cloth or sponge and do not scratch the surface.

If you have stubborn cleaning cases, call your dealer for proper procedures. Do not try your own cleaning procedures as they may permanently damage the canvas.

After each use, especially in salt water areas, rinse the canvas completely with fresh cold water. Then let the canvas dry completely before stowing.

All metal components of the canvas should be rinsed with fresh cold water and exposed components wiped dry to maintain appearance and working order.

10. Exterior Upholstery Fabric

Exterior fabrics should be cleaned with a sponge or very soft scrub brush and a mild soap and warm water solution. After scrubbing, rinse with plenty of cold, clean water and allow the fabric to air dry in a well ventilated place, preferably away from direct sunlight.

Mildew can occur if your boat does not have adequate ventilation. Heat alone will not prevent mildew; you must also provide for fresh air circulation.

REFER TO THE OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND WARRANTY INFORMATION.

11. Interior Upholstery Fabric

NOTICE

Always clean spots, stains, etc., immediately. Test an unseen area of fabric before cleaning stain, to insure that cleaning material will not cause damage.

Cleaning and maintenance information provided by the material manufacturer, is in your Owner's Manual Package.

REFER TO THE OWNER'S MANUAL PACKAGE FOR INSTRUCTIONS AND OTHER CLEANING INFORMATION.

12. Teak

Teak does not require refinishing but should be cleaned occasionally with a teak cleaner, obtainable at marine supply stores. Do not use steel wool in cleaning teak - it leaves rust specks. Bronze wool is available and should be used. Several penetrating protective coatings are available for treating teak and their use is considered advantageous. Because some cleaners can damage gelcoats, aluminum and other materials on your boat, always consult the directions before using any cleaner.